

CRANE RESISTOFLEX®

Flexible Hoses of Teflon® & Silicone

Design Manual

solving
critical
corrosion,
purity, and
longevity
issues in
process
systems



HDM-2006



CRANE RESISTOFLEX[®]

Resistoflex specializes in solving tough fluid handling problems. Our customers make chemicals, paper, steel, and medicine. They process food, water, & minerals, convert energy, and build cars, ships and aircraft.

Our products combine the best materials with innovative manufacturing technology, to help customers operate more reliably, safely, and cost effectively.

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About Resistoflex



**280,000 sq. ft. Headquarters
and Plant in Marion, NC**



**Resistoflex GmbH
Headquarters in Germany**



**Resistoflex Asia
Headquarters in
Singapore**

Resistoflex started manufacturing polyvinyl alcohol (PVA) lined braided hose in New Jersey in 1936. The PVA lined hoses were superior to rubber hose for all types of marine, automotive, and aviation applications both commercial and military. At the end of WWII, the jet engine put new demands on existing hose materials in terms of corrosion resistance and higher temperature handling capabilities. It was at that time that Resistoflex began working with a new material called Teflon® PTFE, and eventually developed and patented a process to extrude PTFE tubing. Resistoflex invented PTFE lined hose in 1953 for the aerospace and chemical industries, and in 1956 introduced the world's first pipe and fittings lined with Teflon® PTFE.

Today, Resistoflex manufactures corrosion-resistant plastic lined pipe, fittings, and Teflon® chemical hoses in our 280,000 sq. ft. plant in Marion, NC. In addition to our domestic capacity, Resistoflex has announced the acquisition of two European facilities, Resistoflex GmbH in Germany, and Resistoflex B.V. in The Netherlands.

In 1995, Resistoflex Industrial added lined pipe and fittings manufacturing capacity in Singapore and established a joint venture in Thailand, making Resistoflex a truly global supplier of plastic lined piping products. To further strengthen the Resistoflex commitment to Asia, we opened a sales and fabrication center in China in 1997.

In 1998, Crane Resistoflex acquired the Plastic Line Piping Products division of The Dow Chemical Company (who invented Saran® lined pipe in 1943), making Resistoflex the largest and most technologically advanced lined piping manufacturer in the world. Resistoflex brings this vast array of experience and know-how to bear in the design, engineering, and manufacturing of corrosion-resistant plastic-lined pipe, fittings, and hoses.

Resistoflex flexible products are provided to the market through a network of knowledgeable and technically proficient manufacturer's representatives and over 300 distributor locations. Please call the factory for your nearest representative or distributor.

Teflon® and Tefzel® are trademarks of DuPont
Saran® is a trademark of The Dow Chemical Company



**Resistoflex B.V. in
The Netherlands**



**Resistoflex PLPP
Shanghai, China**



Resistoflex Product Families

FLANGED PLASTIC-LINED PIPE

Resistoflex plastic lined pipe is made with a locked-in liner to minimize the adverse affects of differential thermal expansion between the liner and the steel.
Available liners are: PP, Kynar® PVDF, and Teflon® PTFE or PFA.



Thermalok Pipe

- ▶ Stress relieved liner
- ▶ Unlimited housing material options
- ▶ Sizes ranging from 1" - 24" diameter

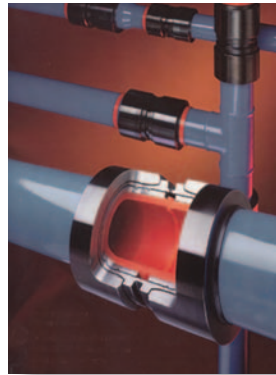
Swaged Pipe

- ▶ Used exclusively for CONQUEST® and MULTI-AXIS®
- ▶ Sizes ranging from 1" - 8"
- ▶ Threaded flanges and threaded rotatable flange assemblies only



PLASTIC-LINED FITTINGS

PP, Kynar® PVDF, and Teflon® PFA fittings are all injection or transfer molded. TEFZEL® lined fittings and special shapes are roto-lined in custom housings. Teflon® PTFE liners are made by isostatic molding.



CONQUEST® CONNECTIONS

- ▶ Patented flangeless joint design
- ▶ Performance of a welded system
- ▶ Available in 1" - 4" for all liner types
- ▶ Virtually zero maintenance

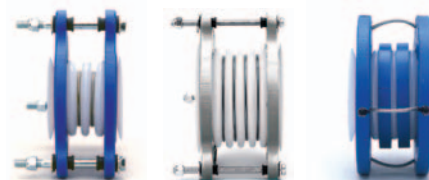


SPECIAL SHAPES

- ▶ Custom fittings, manifolds, and small vessels
- ▶ Lined with TEFZEL® ETFE
- ▶ Available through 24" diameter

Expansion Joints of TEFLON®

- ▶ 2, 3, or 5 Convolute Construction
- ▶ Bolt or Cable Limited
- ▶ Teflon® T-62 for Maximum Flex Life
- ▶ 1" - 24" Size Range
- ▶ DI or SS Flanges Available



Choosing the Right Hose

> Liner Style

There are two basic hose styles to be considered.

1. **Smoothbore:** Hose liner has a smooth (TRUE ID) interior for applications that require no bacteria entrapment.
2. **Convolutd:** Hose liner is vacuum formed from a smooth liner for flexibility, increased vacuum capabilities, and kink resistance. Since the convolutions are open pitched and helical, the media is not as likely to be trapped as with wrapped convoluted hose. They are usually used in applications requiring tight bends and frequent flexing.

> Temperature

Plastics have a tendency to lose strength as the working temperature increases. Resistoflex offers a pressure/vacuum chart for each hose and fitting style based on minimum and maximum working temperature.

> Application

Careful consideration must be taken on the working conditions of the hose. If the assembly is constantly flexing, surging, or in a bent application, it could change the capabilities of the assembly. Kink guards, vacuum spring wires and armor guard protectors can be installed in some applications that will prolong the life of the hose assembly.

> Media

Certainly media is a big factor in which product should be used. One factor to consider is permeation. Some media can diffuse through the liner wall and attack the exterior of the hose. Examples are chlorine, bromine, and hydrogen fluoride, among others. (see the permeation discussion on page 37 for more information). Resistoflex offers various hose systems to combat permeation such as TMH, TMH-Monel® dual containment systems, and exotic braided products with corrosion-resistant braid materials such as Hastelloy®, 316SS, and polypropylene. Custom braid materials such as Kynar® PVDF can also be provided in special applications.

> Pressure/Vacuum

The pressure/vacuum rating coupled with temperature and application usually determines which hose product can be used.

> End Fittings

Hose fittings come in multiple styles and sizes, and each are rated differently. A hose assembly's actual operating pressure is usually limited by the fittings. Fitting material selection is another factor affecting corrosion resistance, purity conditions, and longevity of the assembly. In some cases, gaskets or clamping devices used will ultimately determine the final working pressure capabilities.

> Testing/Qualifying

Resistoflex has a more vigorous quality assurance program than any other hose manufacturer. Resistoflex tests 100% of our hose assemblies both hydrostatically and pneumatically with nitrogen. This assures the end users of good fitting retention and a hose free of defects. See page 36 for testing and qualifying information.

Not All Teflon® is the Same

A frequent point of confusion and misapplication for users specifying hoses is the technical distinction among the various resin options available for high purity, chemical resistant hose liners. Adding to the confusion is the fact that various resins are marketed under the brand name *Teflon*®, including *Teflon*® PTFE (polytetrafluoroethylene) and *Teflon*® FEP (fluorinated ethylene propylene copolymer). *Teflon*® PTFE and *Teflon*® FEP are not equivalent in every hose application.

Teflon® PTFE T-62 has flex life up to 60 times greater than *Teflon*® FEP. In the case of a convoluted hose, pressurization imposes a flex load on the liner as the internal pressure attempts to straighten out the convolutions. Our experience has shown that premature failure may occur when FEP convoluted hoses are used in these applications due to its lower flex life.

Resistoflex does offer a rubber covered smooth bore *Teflon*® FEP lined hose. This hose is suitable in many applications and provides excellent chemical and abrasion resistance properties. *Teflon*® FEP is suitable in this hose construction because the EPDM materials limit the maximum use temperature. Further, the stiffness of the EPDM and its integrated wire reinforcement limits the radius to which the hose is flexed, thus reducing the potential for possible failure due to overbending.

When specifying hoses for use in harsh or high purity applications, it is important to verify which resin is being supplied. Be sure that you're getting a resin suitable for your application. Not all fluoropolymer resins are created equal. Specifying hoses lined with *Teflon*® does not ensure that *Teflon*® PTFE will be supplied.

TR – Truck-Rail Hose

➤ **Inner core:** Smooth *Teflon*® PTFE
Reinforcement: Neoprene rubber

■ Construction

Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner locked internally inside (exclusive Resistoflex Thermalok™ system) multiple plies of fabric-supported Neoprene rubber carcass.

■ Benefits

- Hose design ensures integrity in frequent handling/physical abuse applications
- “One Piece” carcass resists fitting detachment better than crimped-on fittings
- Withstands excessive forces on the end fittings; will not separate but literally pull the hose in half where most crimped fittings separate
- Flanged assemblies are “Flared Through”, providing no exposed metal to the media

■ Applications

For applications which must require a smooth inner bore for improved flow and is easily cleaned in place. TR assemblies are designed to withstand the everyday abuse and handling for loading/unloading trucks, rail cars, barges and process vessels.

■ Fittings



Flared

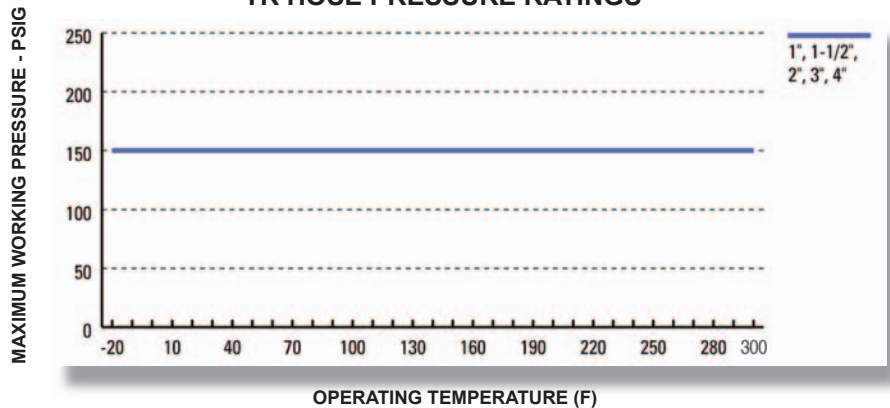
Auxiliary flanges can be added for flared end protection and easy replacement when ends are damaged, thus eliminating the need to replace the complete assembly.

■ External Protective Accessories

Contact factory for details.

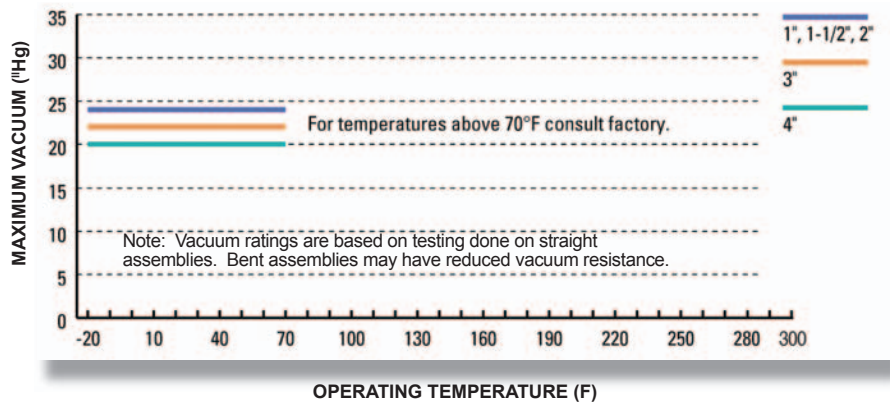


TR HOSE PRESSURE RATINGS



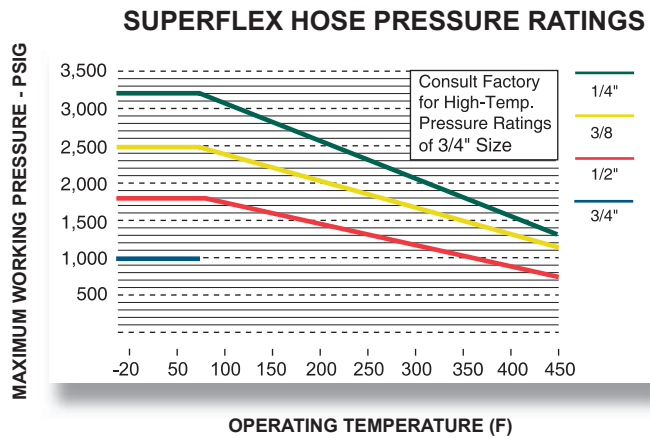
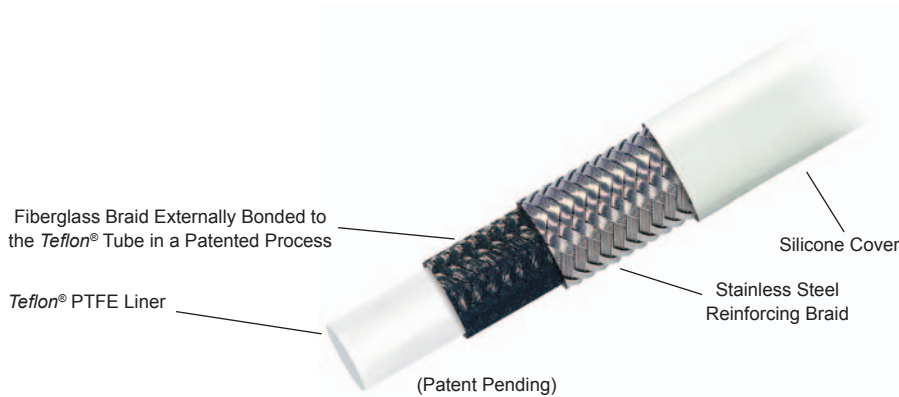
➤ **NOTE:** Hose assembly pressure ratings may be limited by the fittings.

TR HOSE VACUUM RATINGS

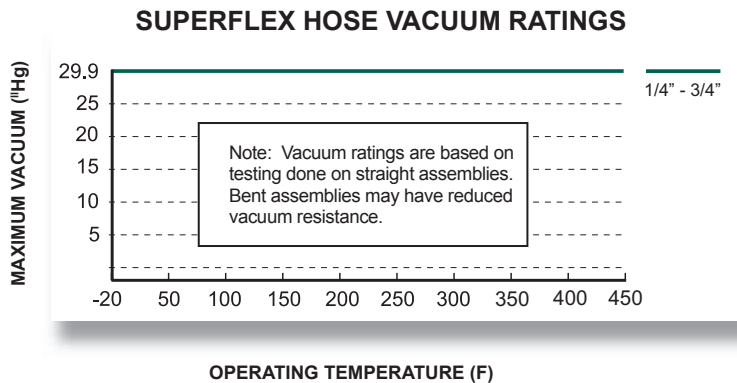


Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR	
1	25	0.875	22.2	1.625	41.3	18	457.2	150	10.3	600	41.4	See pages 46-47
1-1/2	40	1.375	34.9	2.188	55.6	18	457.2	150	10.3	600	41.4	See pages 46-47
2	50	1.875	47.6	2.813	71.5	24	609.6	150	10.3	600	41.4	See pages 46-47
3	80	2.813	71.5	3.813	96.9	30	762.0	150	10.3	600	41.4	See pages 46-47
4	100	3.813	96.9	4.938	125.4	36	914.4	150	10.3	600	41.4	See pages 46-47

SuperFlex SFT-Si Hose



NOTE: For assemblies, pressure ratings of fittings may be less than for the hose.



Inner core: Smooth Teflon® PTFE
Reinforcement: Fiberglass braid, 300-series stainless steel braid, and a silicone cover.

Construction

Natural or conductive smooth bore Teflon® PTFE liner. Liner is covered with a fiberglass braid externally bonded to the liner in a patented process. This is followed by a stainless steel braid and silicone cover.

Benefits

- Ultra Flexible
- True I.D. Sizes
- Very high pressure capability
- No Entrapment Issues
- Wide Variety of Fittings Available
- Validation Almost a Non-Issue
- Vacuum-Rated

Approvals

- FDA (reference 21 CFR 177.1550)
- USDA (21 CFR 177.1550)
- 3A (Sanitary Standards)

Fittings



Fitting Materials

Carbon Steel	316 S.S.
Solid Teflon®	Teflon® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

(consult factory for availability)

External Protective Accessories

See Page 35.

Nominal Size		Hose I.D.		Hose O.D.		Min. Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Liner Part Number	Conductive Liner Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/4"	8	0.250	6.3	0.445	11.3	2.00	50.8	3,200	220.8	14,000	966	04-SFT-W	04-SFT-B
3/8"	10	0.375	9.5	0.710	18	2.50	63.5	2,500	172.5	10,000	690	06-SFT-W	06-SFT-B
1/2"	15	0.500	12.7	0.890	22.6	3.00	76.2	1,800	124.2	7,200	496.8	08-SFT-W	08-SFT-B
3/4"	20	0.750	19	1.120	28.4	5.00	127	1,000	69	6,000	414	12-SFT-W	12-SFT-B



TRC-FEP Rubber Covered Hose

➤ **Inner core:** Smooth *Teflon*® FEP
Reinforcement: EPDM rubber

■ Construction

White smooth bore *Teflon*® FEP liner bonded to a reinforced green EPDM rubber cover. A carbon steel wire helically wound through the carcass provides crush, kink and vacuum resistance.

■ Benefits

- Low cost corrosion and kink resistance
- Highly flexible and abrasion resistant
- Full vacuum capability throughout temperature range up to 4" diameter

■ Applications

For applications requiring a true smooth inner bore for improved flow and which is easily cleaned in place. Ideal where flexibility is important and abrasive external conditions are present.

■ Fittings



■ Fitting Materials

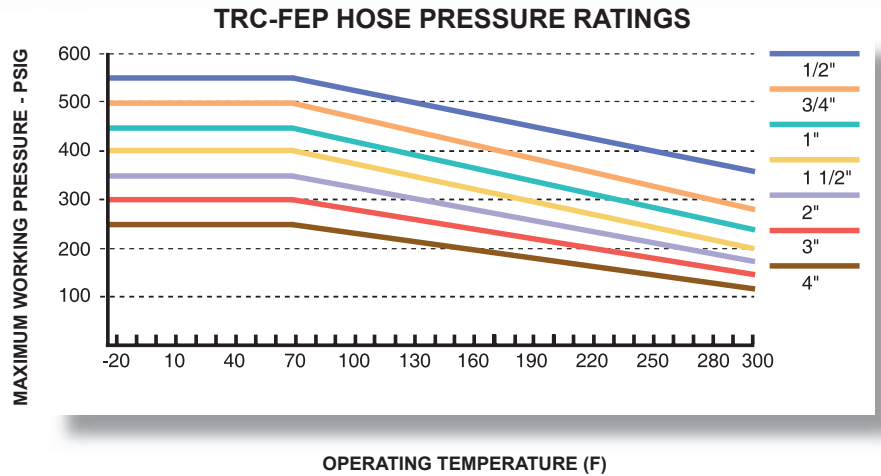
- | | |
|-----------------------|------------------------------|
| Carbon Steel | 316 S.S. |
| Solid <i>Teflon</i> ® | <i>Teflon</i> ® Encapsulated |
| Solid Kynar® | Solid Polypropylene |
| Monel® | Hastelloy® |

(consult factory for availability)

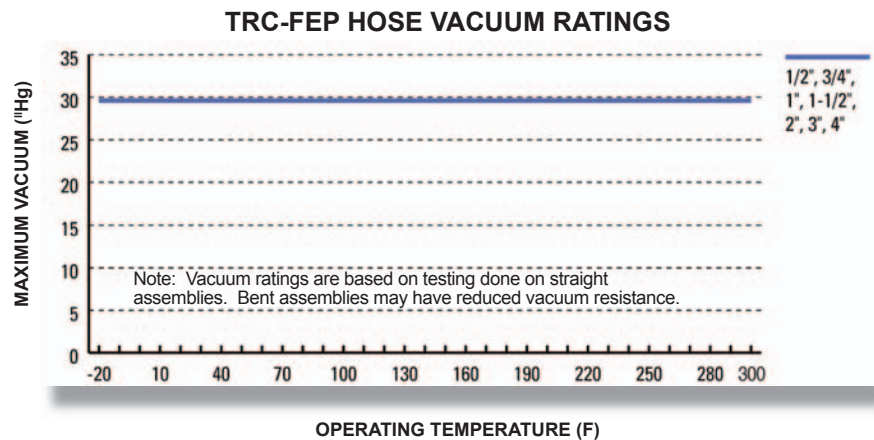
■ External Protective Accessories

See page 35.

Custom colors available upon request.
 Minimum order quantity applies.



➤ NOTE: Hose assembly pressure ratings may be limited by the fittings.



Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number
INCH	DN	INCH	MM	INCH	MM	INCH	MM	PSIG	BAR	PSIG	BAR	
1/2	15	0.525	13.3	1.125	28.6	2	76.2	550	37.9	2200	151.8	08-TRC-FEP-W
3/4	20	0.775	19.7	1.380	35.1	4.5	114.3	500	34.5	2000	137.9	12-TRC-FEP-W
1	25	1.015	25.8	1.650	41.9	7	177.8	450	31	1800	124.1	16-TRC-FEP-W
1-1/2	40	1.510	38.4	2.150	54.6	13	330.2	400	27.6	1600	110.3	24-TRC-FEP-W
2	50	2.010	51.1	2.670	67.8	18	457.2	350	24.1	1400	96.5	32-TRC-FEP-W
3	80	3.015	76.6	3.812	96.8	28	711.2	300	20.7	1200	82.7	48-TRC-FEP-W
4	100	4.010	101.9	4.937	125.4	42	1066.8	250	17.2	1000	68.9	64-TRC-FEP-W

SMOOTH BORE



TRC Rubber Covered Hose

➤ **Inner core:** Smooth *Teflon*® PTFE
Reinforcement: EPDM rubber

Construction

Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner bonded to a reinforced blue or light gray/white EPDM rubber cover. A carbon steel wire helically wound through the carcass provides crush, kink and vacuum resistance.

Benefits

- Extra-thick *Teflon*® PTFE smooth liner provides better permeation resistance (see permeation discussion on page 37) than thinner FEP lined hoses.
- EPDM cover provides great flexibility
- PTFE inner core provides better flex life than FEP lined hoses (see pages 6 and 38)

Applications

Designed for applications requiring a true smooth inner bore for improved flow and is easily cleaned in place. Ideal where abrasive external conditions, flexing or permeation situations are present.

Fittings



Fitting Materials

Carbon Steel	316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

(consult factory for availability)

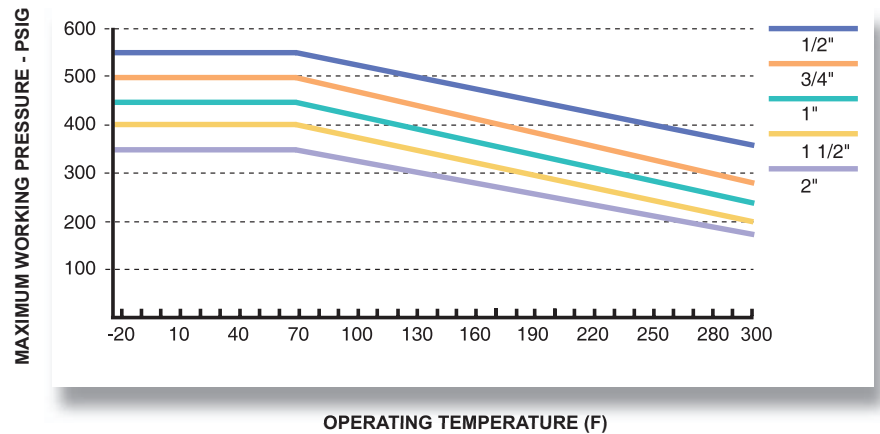
External Protective Accessories

See Page 35.



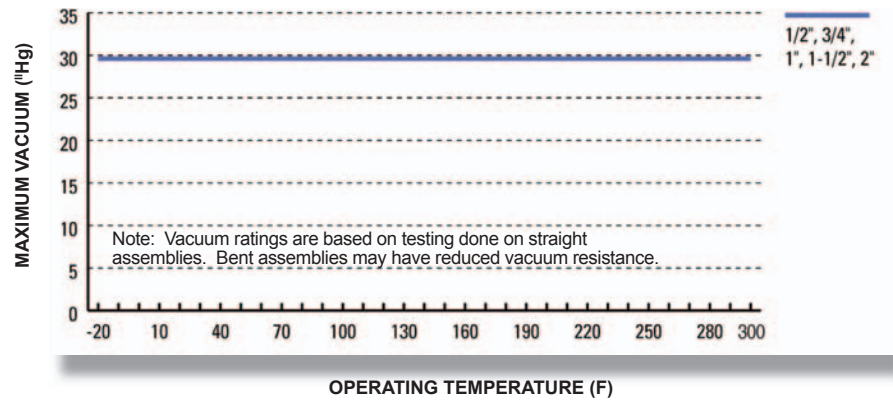
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TRC HOSE PRESSURE RATINGS



➤ **NOTE:** Hose assembly pressure ratings may be limited by the fittings.

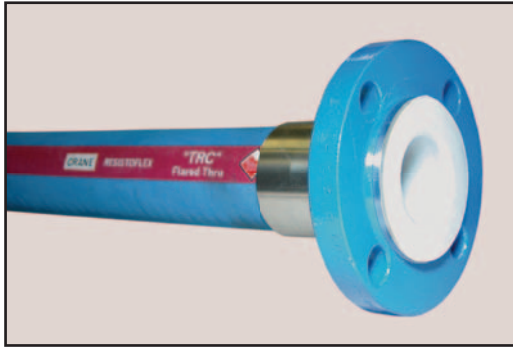
TRC HOSE VACUUM RATINGS



Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number (Blue Cover)	Conductive Part Number (Blue Cover)	Natural Part Number (Light Gray Cover)	Conductive Part Number (Light Gray Cover)
INCH	DN	INCH	MM	INCH	MM	INCH	MM	PSIG	BAR	PSIG	BAR				
1/2	15	0.525	13.3	1.125	28.6	2	76.2	550	37.9	2200	151.8	08-TRC-W	08-TRC-B	08-WTRC-W	08-WTRC-B
3/4	20	0.775	19.7	1.380	35.1	4.5	114.3	500	34.5	2000	137.9	12-TRC-W	12-TRC-B	12-WTRC-W	12-WTRC-B
1	25	1.015	25.8	1.650	41.9	7	177.8	450	31	1800	124.1	16-TRC-W	16-TRC-B	16-WTRC-W	16-WTRC-B
1-1/2	40	1.510	38.4	2.150	54.6	13	330.2	400	27.6	1600	110.3	24-TRC-W	24-TRC-B	24-WTRC-W	24-WTRC-B
2	50	2.010	51.1	2.670	67.8	18	457.2	350	24.1	1400	96.5	32-TRC-W	32-TRC-B	32-WTRC-W	32-WTRC-B



TRC Flared-Through Hose



➤ **Inner core:** Smooth *Teflon*® PTFE
Reinforcement: EPDM rubber

Construction

Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner bonded to a reinforced blue or light gray/white EPDM rubber cover. A carbon steel wire helically wound through the carcass provides crush, kink and vacuum resistance. Liner is flared out over the face of the fitting.

Benefits

- Patented Flare-Through Design
- Patented Thermalok™ Process Results in Interference Fit Liner
- No Entrapment Issues
- True Sanitary I.D. Dimensions
- Wide Variety of Fittings Available
- Full Vacuum-Rated

Fittings



Fitting Materials

Carbon Steel 316 S.S.
 Solid Teflon® Teflon® Encapsulated
 Solid Kynar® Solid Polypropylene
 Monel® Hastelloy®

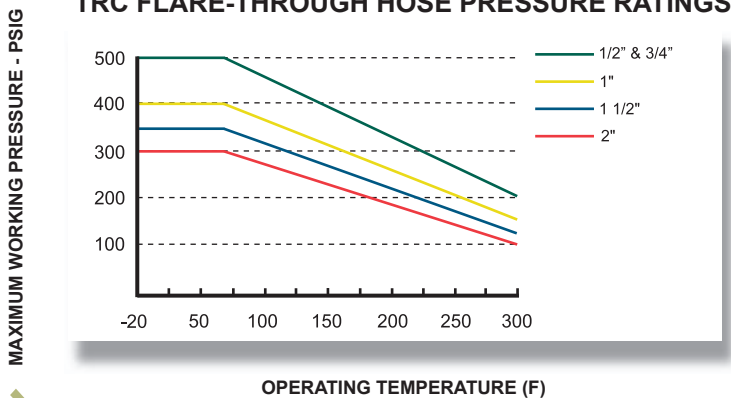
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External Protective Accessories

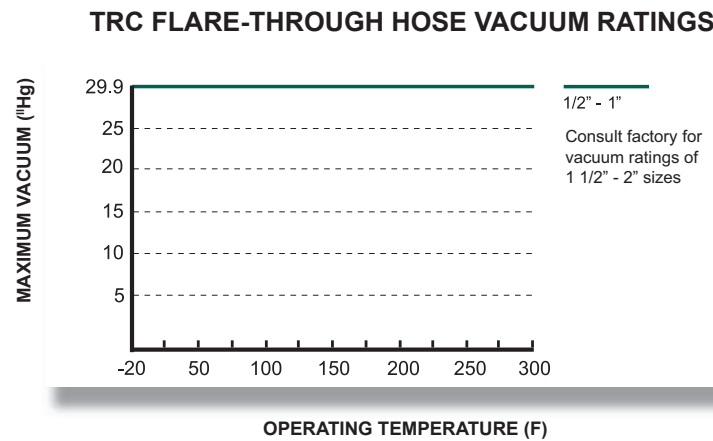
See Page 35.

Custom colors available upon request.
 Minimum order quantity applies.

Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.



NOTE: For assemblies, pressure ratings of fittings may be less than for the hose.



Size		Hose I.D.		Hose O.D.		Min Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Liner Part Number	Conductive Liner Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.500	12.7	1.02	25.9	2.5	63.5	500	34.5	2000	137.8	08-TRCF-W	08-TRCF-8
3/4	20	0.750	19.05	1.30	33	3	76.2	500	34.5	2000	137.8	12-TRCF-W	12-TRCF-8
1	25	1.000	25	1.56	39.6	4	101.6	400	27.6	1600	110.3	16-TRCF-W	16-TRCF-8
1-1/2	40	1.500	38.1	2.05	52	12	304.8	350	24.1	1400	96.5	24-TRCF-W	24-TRCF-8
2	50	2.000	51	2.56	65	12	304.8	300	20.7	1200	82.8	32-TRCF-W	32-TRCF-8

SBT Braided Hose

Inner core: Smooth *Teflon*® PTFE
Reinforcement: 300-series stainless steel braid

Construction

Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner braided with 300-series stainless steel heavy gauge wire (1" and 1-1/2" are double-braided for extra kink resistance).

Benefits

- Provides higher working temperatures and full vacuum capabilities
- Heavy gauge stainless steel braid is corrosion resistant against most chemicals
- Flanged assemblies can be "Flared Through" providing no bacteria traps
- Available in long lengths
- "True ID", for superior flow characteristics and easy dimensional matchup

Applications

Designed for applications requiring a true smooth inner bore for improved flow and which is easily cleaned in place. Excellent in static applications where handling, flexing or abuse is minimal.

Fittings



Threaded Flanged Cam & Groove Sanitary

Fitting Materials

Carbon Steel	316 S.S.
Solid Teflon®	Teflon® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

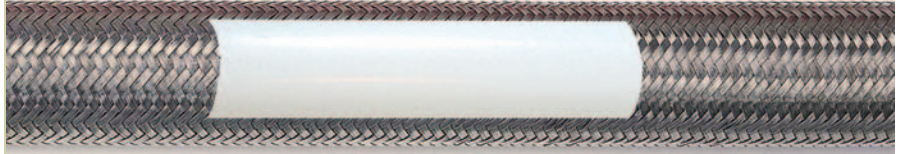
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External Protective Accessories

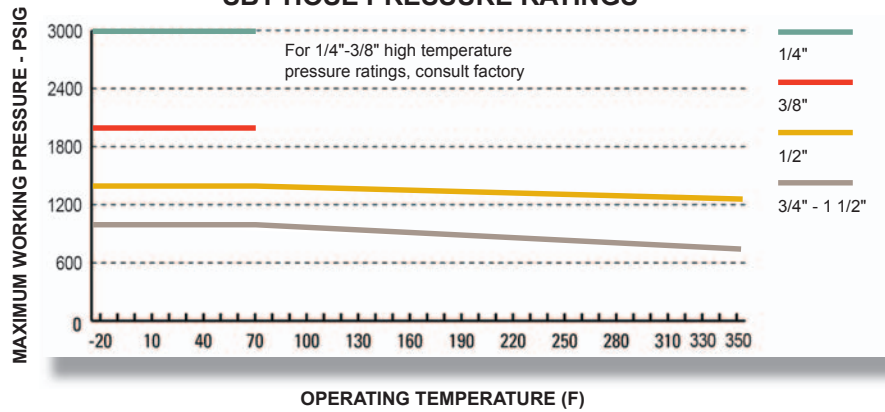
See Page 35.

Custom colors available upon request. Minimum order quantity applies.

Extruded silicone protection sleeve offered with designation SBT-Si

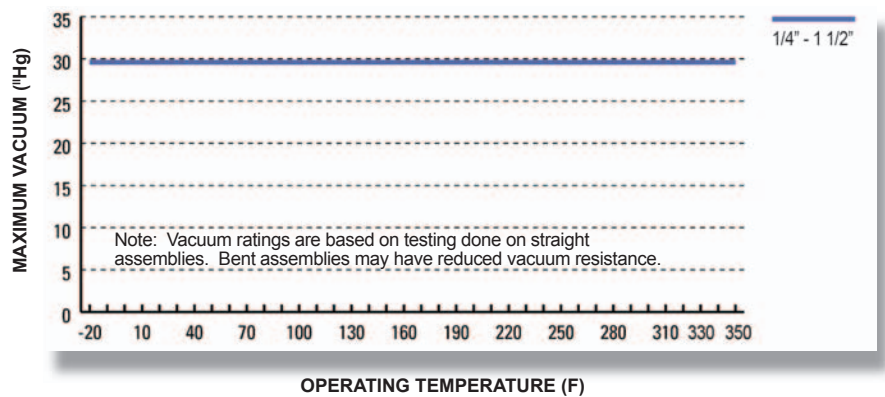


SBT HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings.

SBT HOSE VACUUM RATINGS



Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/4	8	0.250	6.3	.375	9.5	3	50.8	3000	207	12000	828	04-SBT-W	04-SBT-B
3/8	10	0.375	9.5	.515	13	5	127	2000	138	8000	552	06-SBT-W	06-SBT-B
1/2	15	0.500	12.7	0.633	16.1	6.5	165.1	1425	98.2	5700	393	08-SBT-W	08-SBT-B
3/4	20	0.750	19.1	0.875	22.2	8.2	208.3	1000	68.9	4000	275.8	12-SBT-W	12-SBT-B
1	25	1.000	25.4	1.190	30.2	12	304.8	1000	68.9	4000	275.8	16-SBT-W	16-SBT-B
1-1/2	40	1.500	38.1	1.762	44.8	14	355.6	1000	68.9	4000	275.8	24-SBT-W	24-SBT-B

SBTF Braided Hose



Inner core: Smooth *Teflon*® PTFE
Reinforcement: 300-series stainless steel braid

Construction

Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner braided with 300-series stainless steel heavy gauge wire (1" and 1-1/2" are double-braided for extra kink resistance).

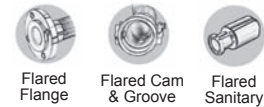
Benefits

- "Flared Through" system allows *Teflon*® PTFE protection of all wetted surfaces
- Provides higher working temperatures and full vacuum capabilities
- Heavy gauge stainless steel braid is corrosion resistant against most chemicals
- Available in long lengths
- "True ID", for superior flow characteristics and easy dimensional matchup

Applications

Designed for applications requiring a true smooth inner bore for improved flow and which is easily cleaned in place. Excellent in static applications where handling, flexing or abuse is minimal.

Fittings



Flared Flange Flared Cam & Groove Flared Sanitary

Fitting Materials

Carbon Steel	316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

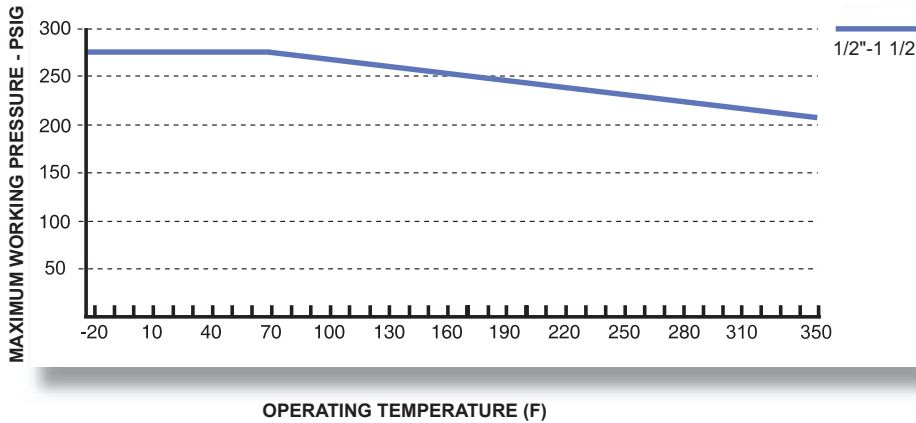
(consult factory for availability)

External Protective Accessories

See Page 35.

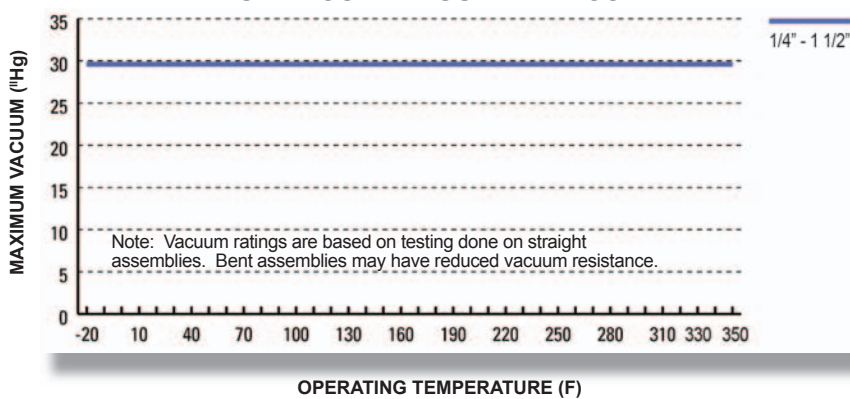
Custom colors available upon request. Minimum order quantity applies.
 Extruded silicone protection sleeve offered with designation SBT-Si

SBTF HOSE PRESSURE RATINGS



OPERATING TEMPERATURE (F)

SBT HOSE VACUUM RATINGS



OPERATING TEMPERATURE (F)

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.540	13.7	.760	19.3	8.2	208.3	275	18.9	1100	75.8	08-SBT-W	08-SBT-B
3/4	20	0.750	19.1	.875	22.2	8.2	208.3	275	18.9	1100	75.8	12-SBT-W	12-SBT-B
1	25	1.000	25.4	1.190	30.2	12	304.8	275	18.9	1100	75.8	16-SBT-W	16-SBT-B
1-1/2	40	1.500	38.1	1.762	44.8	14	355.6	275	18.9	1100	75.8	24-SBT-W	24-SBT-B

TMH Dual Containment System

Primary Containment (inner core): Smooth *Teflon*[®] PTFE

Secondary containment: 316 stainless steel, convoluted metal hose

Reinforcement: 316 stainless steel braid

Construction

Extra-thick natural or conductive smooth bore *Teflon*[®] PTFE liner locked inside (exclusive Thermalok[™] system) a 316 stainless steel carcass with welded flange retainers and over braided with 316 stainless steel. The liner is "Flared Through" the stub ends providing no exposed metal fittings to the media.

Benefits

- Dual Containment - welded 316 SS carcass acts as a barrier between the inner liner of *Teflon*[®] and the atmosphere
- Reduced risk of the catastrophic failure and environmental releases
- Vent acts as a warning system, allowing the hose to be removed prior to failure
- A coupling can be installed over the vent hole to contain or recycle permeants.

Applications

For severe service applications where leak prevention is imperative.

Fittings



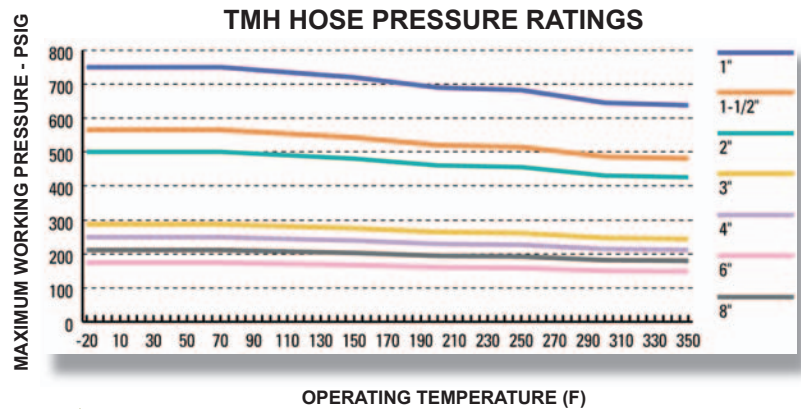
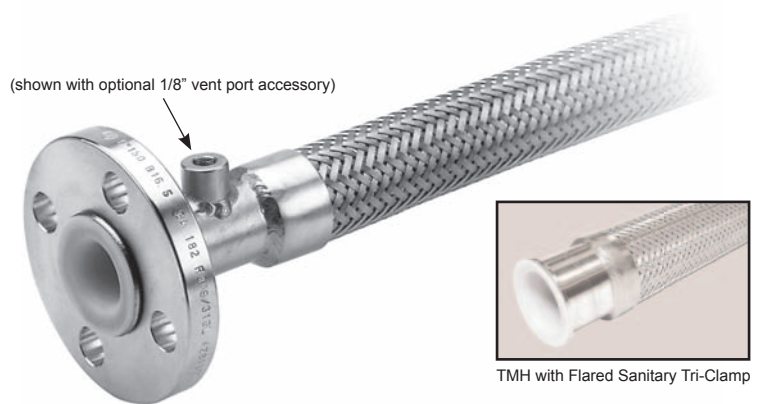
Auxiliary flanges can be added for flanged end protection and easy replacement when ends are damaged, thus eliminating the need to replace the complete assembly

Optional Vent Systems

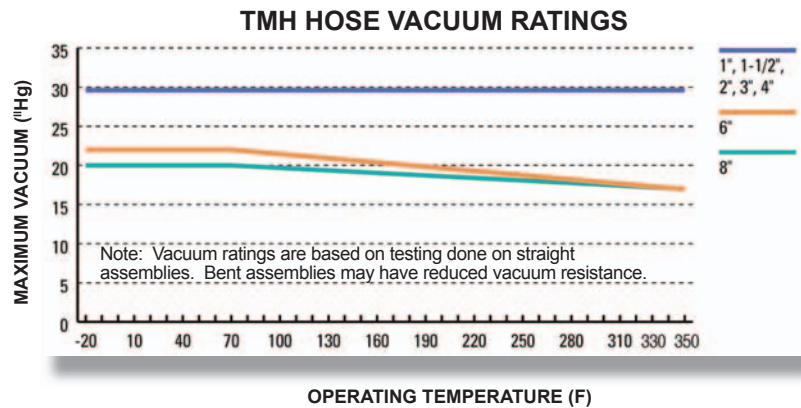
- Vent hole
- Vent coupling 1/8" female pipe
- Hastelloy[®] leak detection system (factory)

External Protective Accessories

Contact factory for details.



NOTE: Hose assembly pressure ratings may be limited by the fittings.



Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR	
1	25	0.875	22.2	1.590	40.4	12	304.8	750	51.7	3000	206.8	See pages 46-47
1-1/2	40	1.375	34.9	2.270	57.7	15	381.0	565	39.0	2260	155.8	See pages 46-47
2	50	1.875	47.6	2.910	73.9	21	533.4	500	34.5	2000	137.9	See pages 46-47
3	80	2.797	71.0	3.690	93.7	28	711.2	288	19.9	1152	79.4	See pages 46-47
4	100	3.766	95.7	4.840	122.9	46	1168.4	250	17.2	1000	68.9	See pages 46-47
6	150	5.688	144.5	7.160	181.9	65	1651.0	175	12.1	700	48.3	See pages 46-47
8	200	7.718	196.0	9.310	236.5	89	2260.6	212	14.6	848	58.5	See pages 46-47



TMH-Monel® Dual Containment System



Primary Containment (inner core): Smooth *Teflon*® PTFE

Secondary containment: Monel® 400, convoluted metal hose (Hastelloy available)

Reinforcement: Heavy gauge Monel® braid

Construction

Extra-thick natural or conductive smooth bore *Teflon*® PTFE liner locked inside (exclusive Thermalok™ system) a Monel® 400 carcass with welded Monel® flange retainers and over braided with heavy gauge Monel®. The liner is "Flared Through" the stub ends providing no exposed metal fittings to the media.

Benefits

- Dual Containment - welded Monel® carcass acts as a barrier between the inner liner of *Teflon*® and the atmosphere (excellent chlorine transfer hose)
- Reduced risk of the catastrophic failure and environmental releases.
- Vent acts as a warning system, allowing the hose to be removed prior to failure.
- A coupling can be installed over the vent hole to contain or recycle permeants.

Applications

TMH-Monel® assemblies with Thermalok™ PTFE liner designed to withstand extreme corrosive applications such as chlorine, HCl, where leak prevention is imperative and chlorine can stress crack stainless steel.

Fittings



Flared Flange

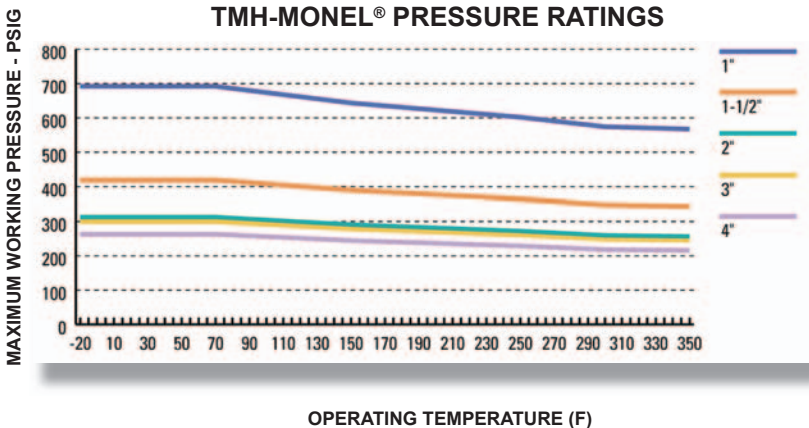
Auxiliary flanges can be added for flared end protection and easy replacement when ends are damaged, thus eliminating the need to replace the complete assembly.

Optional Vent Systems

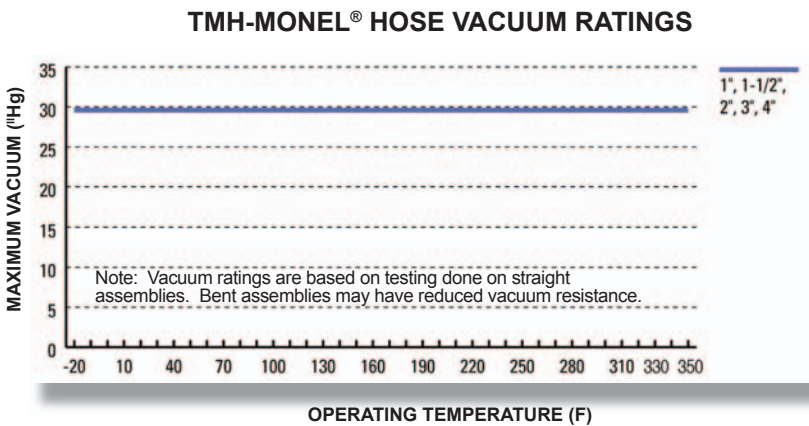
- Vent hole
- Vent coupling 1/8" female pipe
- Hastelloy® leak detection system (factory)

External Protective Accessories

Contact factory for details.



NOTE: Hose assembly pressure ratings may be limited by the fittings.



Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR	
1	25	0.875	22.2	1.590	40.4	12	304.8	692	47.7	2768	190.8	See pages 46-47
1-1/2	40	1.375	34.9	2.270	57.7	15	381.0	419	28.9	1676	115.5	See pages 46-47
2	50	1.875	47.6	2.910	73.9	21	533.4	313	21.6	1252	86.3	See pages 46-47
3	80	2.797	71.0	3.690	93.7	28	711.2	300	20.7	1200	82.7	See pages 46-47
4	100	3.766	95.7	4.840	122.9	46	1168.4	263	18.1	1052	72.5	See pages 46-47

SVT-Seamless Vent Tubing Assembly

Seamless Vent Tubing

Construction

Extra-thick, natural or conductive “seamless” helical convoluted *Teflon*® PTFE with “Flared Through” flanges, pipe or tubing sized cuffs or crimped-on fitting options.

Benefits

SVT - “Seamless” Vent Tubing assemblies are vacuum formed in an open pitched, helical design for easy cleaning.

- “Flared Through” and cuffed end system allows *Teflon*® PTFE protection of all wetted surfaces
- Eliminates bacteria traps
- Crush resistant and easy to flex
- Fitting-to-hose crevices are eliminated, increasing flow rates
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

Applications

For low pressure vent or vapor recovery systems, pharmaceutical, chemical, food and beverage, and other applications requiring an extremely flexible, lightweight *Teflon*® PTFE assembly.

Fittings



Fitting Materials

Carbon Steel	316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

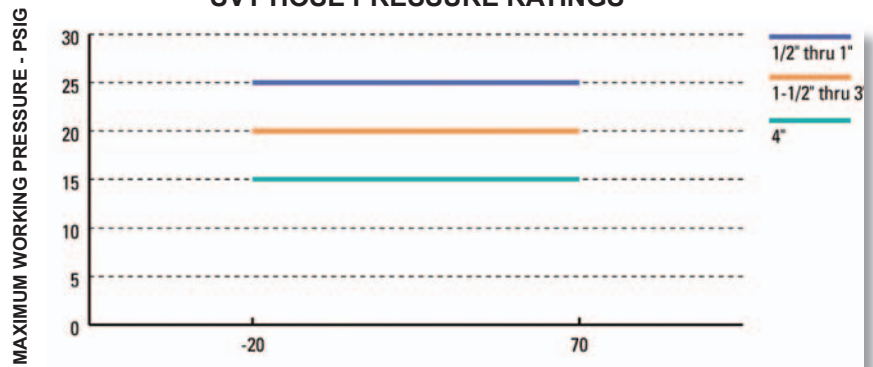
(consult factory for availability)

External Protective Accessories

See Page 35.

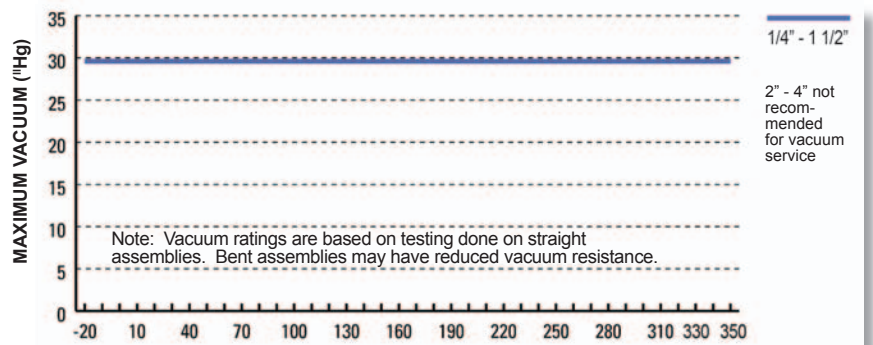


SVT HOSE PRESSURE RATINGS



Degrees Fahrenheit (consult factory for use at elevated temperatures)

SVT HOSE VACUUM RATINGS



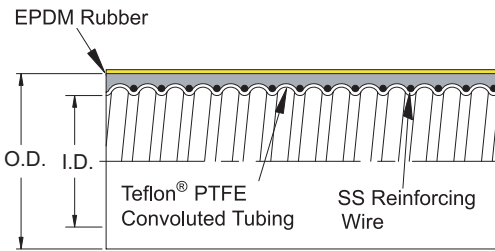
Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

OPERATING TEMPERATURE (F)

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR	
1/2	15	0.500	12.7	0.700	17.8	2	50.8	25	1.7	100	6.9	See pages 46-47
3/4	20	0.760	19.3	0.990	25.1	2	50.8	25	1.7	100	6.9	See pages 46-47
1	25	1.025	26.0	1.280	32.5	3	76.2	25	1.7	100	6.9	See pages 46-47
1-1/2	40	1.525	38.7	1.960	49.8	4.5	114.3	20	1.4	80	5.5	See pages 46-47
2	50	2.025	51.4	2.390	60.7	8	203.2	20	1.4	80	5.5	See pages 46-47
3	80	2.913	74.0	3.622	92.0	14	355.6	20	1.4	80	5.5	See pages 46-47
4	100	3.937	100.0	4.921	125.0	20	508.0	15	1.0	60	4.1	See pages 46-47

Twister™ CRC Hose

Twister™



(Patent Pending)

➤ **Inner core:** Convoluted Teflon® PTFE

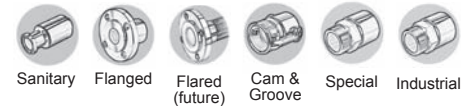
Reinforcement: SS reinforcing wire and EPDM cover

■ Convoluted Teflon® PTFE Rubber-Covered Hose

■ Benefits

- Ultra Flexible
- Virtually Kink-Proof
- Self-Draining Helical Convolutes
- Wide Variety of Fittings Available
- Tough Rubber Outer Cover
- Vacuum-Rated
- Patent Pending

■ Fittings

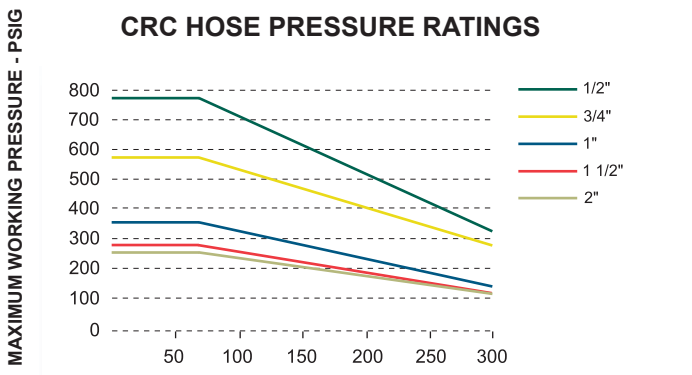


■ Fitting Materials

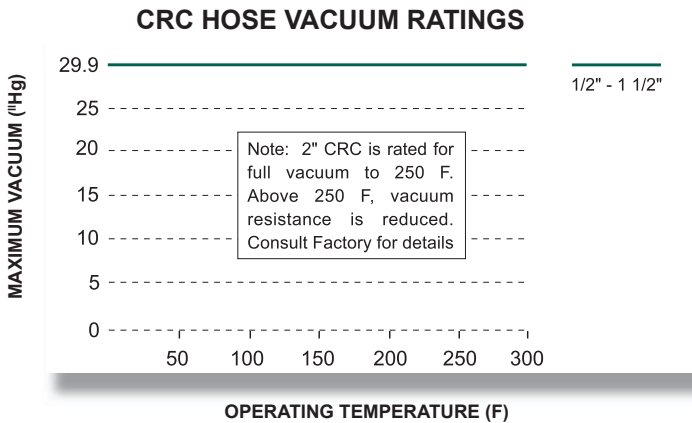
Carbon Steel 316 S.S.
 Solid Teflon® Teflon® Encapsulated
 Solid Kynar® Solid Polypropylene
 Monel® Hastelloy®
 (consult factory for availability)

■ External Protective Accessories

See Page 35.



➤ **NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.



Size		Hose I.D.		Hose O.D.		Min. Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Liner Part Number	Conductive Liner Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.471	12	0.970	24.6	0.500	12.7	785	54.1	3140	216.5	08-CRC-W	08-CRC-B
3/4	20	0.720	18.3	1.250	31.7	0.750	19	570	39.3	2280	157.2	12-CRC-W	08-CRC-B
1	25	0.970	24.6	1.560	39.6	1.000	25.4	350	24.1	1400	96.5	16-CRC-W	08-CRC-B
1-1/2	40	1.540	39	2.240	56.9	1.500	38.1	295	20.33	1180	81.4	24-CRC-W	08-CRC-B
2	50	1.970	50	2.670	67.8	2.000	50.8	275	19	1100	75.8	32-CRC-W	08-CRC-B



CB-Convoluted Stainless Braided

Inner core: "Seamless" convoluted *Teflon*® PTFE

Reinforcement: 316 stainless steel braid (Hastelloy® and custom braids available)

Construction

Extra-thick natural or conductive "seamless" helical convoluted *Teflon*® PTFE liner braided with 316 stainless steel heavy gauge wire.

Benefits

- Open-pitched, helical convolutions for easy cleaning
- Rated for both medium pressure and full vacuum applications
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

Applications

For pharmaceutical, chemical, food and beverage, and other applications requiring an extremely flexible, lightweight *Teflon*® PTFE hose assembly.

Fittings



See CBF, pg. 19, for "Flared Through" assemblies.

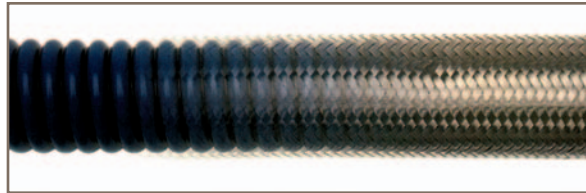
Fitting Materials

Carbon Steel	316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

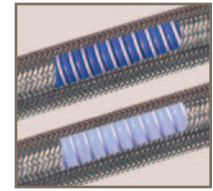
(consult factory for availability)

External Protective Accessories

See Page 35.

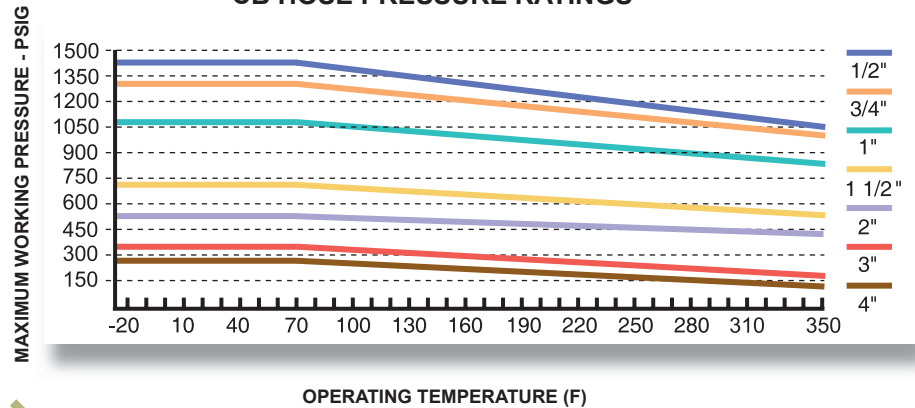


(conductive liner shown)



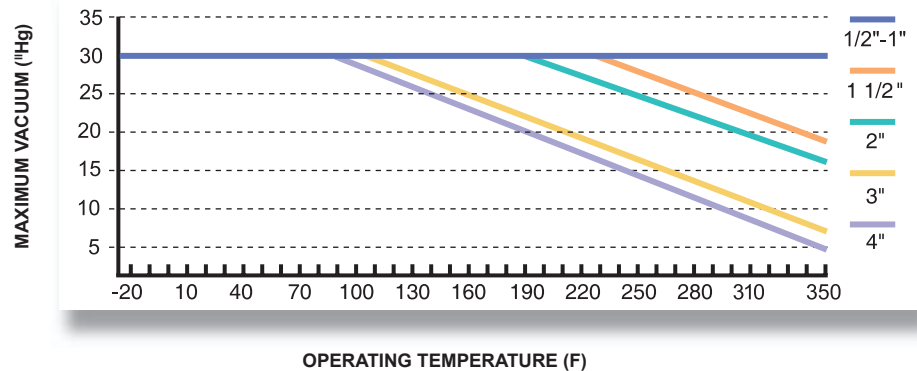
Optional Wire Wrap (pressure ratings with wire wrap are shown on Pg. 19)

CB HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings and options.

CB HOSE VACUUM RATINGS



Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

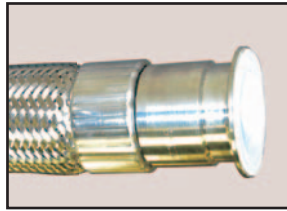
Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.470	11.9	0.748	19	2	50.8	1425	98.2	5700	393.0	08-CB-W	08-CB-B
3/4	20	0.720	18.3	1.048	26.6	2.75	69.9	1300	89.6	5200	358.5	12-CB-W	12-CB-B
1	25	0.970	24.6	1.354	34.4	4	101.6	1100	75.8	4400	303.3	16-CB-W	16-CB-B
1-1/2	40	1.540	39.1	2.034	51.7	6	152.4	700	48.3	2800	193.0	24-CB-W	24-CB-B
2	50	1.970	50.0	2.464	62.6	7.5	190.5	525	36.2	2100	144.8	32-CB-W	32-CB-B
3	50	2.913	74.0	3.702	94.0	14	355.6	350	24.1	1400	96.6	48-CB-W	48-CB-B
4	50	3.937	100.0	5.000	127.0	16	406.4	275	19	1100	75.9	64-CB-W	64-CB-B



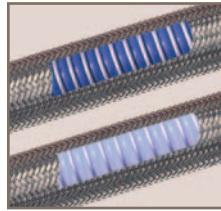
CBF– Convoluted Stainless Braided Flared-Through



Flared-Through Female Cam

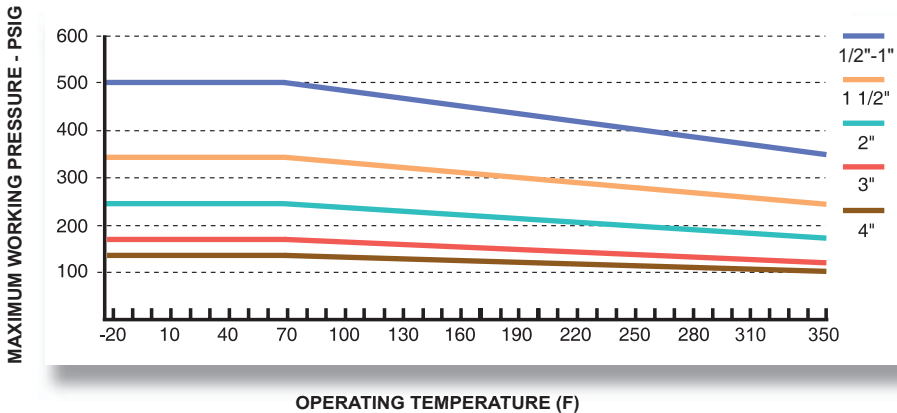


Flared-Through Sanitary Tri-Clamp



Optional Wire Wrap

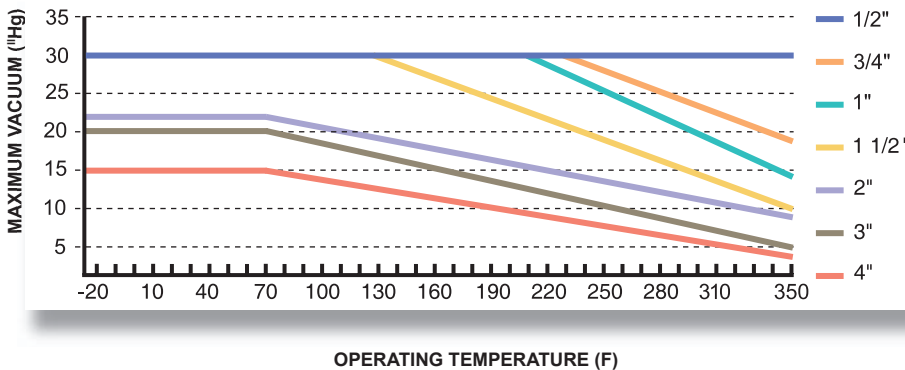
CBF HOSE PRESSURE RATINGS*



* Use these pressure ratings for CB hose with optional wire wrap

NOTE: Hose assembly pressure ratings may be limited by the fittings.

CBF HOSE VACUUM RATINGS



Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

Inner core: “Seamless” convoluted *Teflon*® PTFE
Reinforcement: 316 stainless steel braid (Hastelloy® and custom braids available)

Construction

Extra-thick natural or conductive “seamless” helical convoluted *Teflon*® PTFE liner braided with 316 stainless steel heavy gauge wire. The liner is passed through the inside of the fitting and flared over the face, creating a self-gasketing sealing surface.

Benefits

- Open-pitched, helical convolutions for easy cleaning
- “Flared Through” system allows *Teflon*® PTFE protection of all wetted surfaces
- Eliminates bacteria traps
- Fitting-to-hose crevices are also eliminated, thereby increasing flow rates
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

Applications

For pharmaceutical, chemical, food and beverage, and other applications requiring an extremely flexible, lightweight *Teflon*® PTFE hose with no metal exposed to the media.

Fittings



Fitting Materials

Carbon Steel	316 S.S.
Solid Teflon®	Teflon® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

(consult factory for availability)

External Protective Accessories

See Page 35.

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.470	11.9	0.748	19	2	50.8	500	34.5	2000	137.9	08-CB-W	08-CB-B
3/4	20	0.720	18.3	1.048	26.6	2.75	69.9	500	34.5	2000	137.9	12-CB-W	12-CB-B
1	25	0.970	24.6	1.354	34.4	4	101.6	500	34.5	2000	137.9	16-CB-W	16-CB-B
1-1/2	40	1.540	39.1	2.034	51.7	6	152.4	350	24.1	1400	96.5	24-CB-W	24-CB-B
2	50	1.970	50.0	2.464	62.6	7.5	190.5	250	17.2	1000	68.9	32-CB-W	32-CB-B
3	75	2.913	74.0	3.702	94.0	14	355.6	175	12.1	700	48.4	48-CB-W	48-CB-B
4	100	3.937	100.0	5.000	127.0	16	406.4	150	10.3	600	41.2	64-CB-W	64-CB-B



CHB—Convuluted Hastelloy® Braided

➤ **Inner core:** “Seamless” convuluted *Teflon*® PTFE
Reinforcement: Hastelloy® C276 heavy gauge wire braid

■ Construction

Extra-thick conductive “seamless” helical convuluted *Teflon*® PTFE liner braided with Hastelloy® C276 heavy gauge wire braid.

■ Benefits

- Open-pitched, helical convolutions for easy cleaning
- Rated for both medium pressure and full vacuum applications
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore alternatives
- Hastelloy® C276 braid is resistant to most chemicals introduced to the external surface of the hose through permeation, spillage, or atmospheric conditions
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

■ Applications

For applications requiring an extremely flexible, lightweight *Teflon*® PTFE hose assembly conveying chemicals that permeate aggressively, or for harsh atmospheric conditions that require extreme corrosion resistance on the exterior of the assembly.

■ Fittings

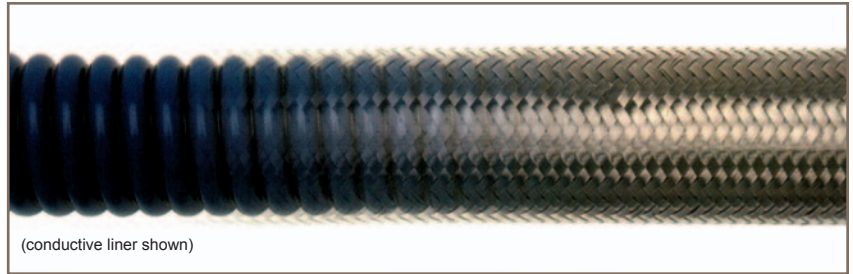


■ Fitting Materials

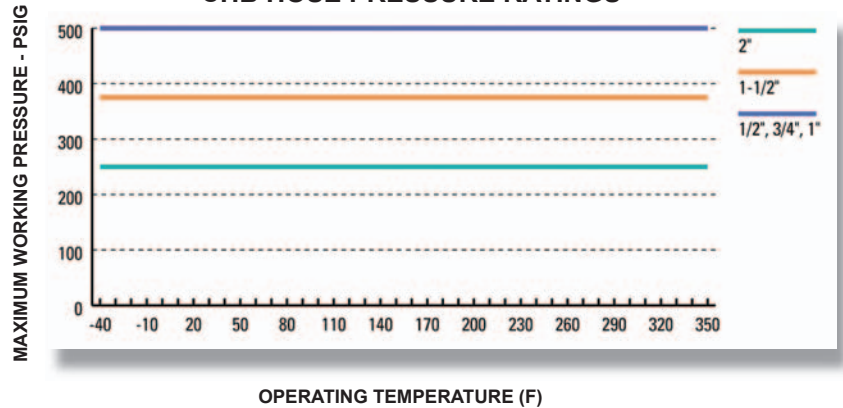
Carbon Steel	316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®
(consult factory for availability)	

■ External Protective Accessories

See Page 35.

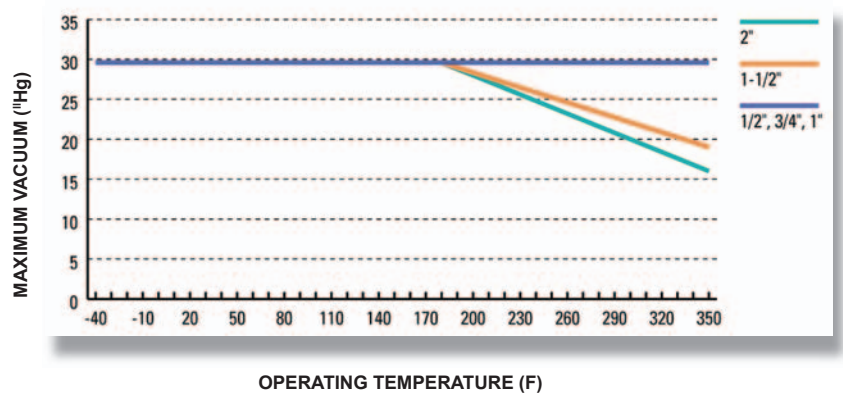


CHB HOSE PRESSURE RATINGS



➤ **NOTE:** Hose assembly pressure ratings may be limited by the fittings.

CHB HOSE VACUUM RATINGS



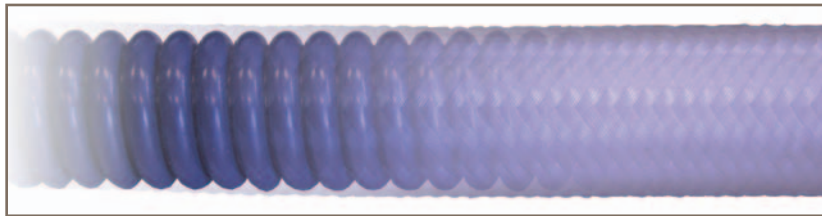
OPERATING TEMPERATURE (F)

Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.470	11.9	0.748	19.0	2	50.8	500	34.5	2500	172.4	08-CHB-W	08-CHB-B
3/4	20	0.720	18.3	1.048	26.6	2.75	63.5	500	34.5	2500	172.4	12-CHB-W	12-CHB-B
1	25	0.970	24.6	1.354	34.4	4	101.6	500	34.5	2500	172.4	16-CHB-W	16-CHB-B
1-1/2	40	1.540	39.1	2.034	51.7	6	152.4	375	25.9	1875	129.3	24-CHB-W	24-CHB-B
2	50	1.970	50.0	2.464	62.6	7.5	190.5	250	17.2	1250	86.2	32-CHB-W	32-CHB-B

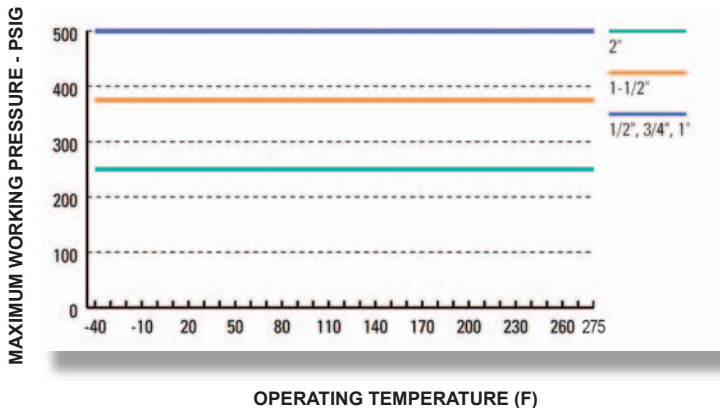


CKB—Convuluted Kynar® Braided



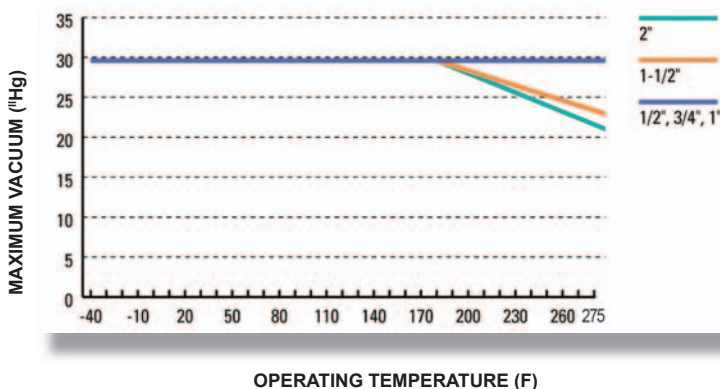
(conductive liner shown)

CKB HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings.

CKB HOSE VACUUM RATINGS



Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

➤ **Inner core:** "Seamless" convoluted *Teflon*® PTFE
Reinforcement: Kynar® PVDF heavy double braid

Construction

Extra-thick, natural or conductive "seamless" helical convoluted *Teflon*® PTFE liner braided with Kynar® PVDF monofilament heavy gauge wire braid.

Benefits

- Open-pitched, helical convolutions for easy cleaning
- Rated for both medium pressure and full vacuum applications
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore alternatives
- Kynar® braid is resistant to most chemicals introduced to the external surface of the hose through permeation, spillage, or atmospheric conditions.
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

Applications

For applications requiring an extremely flexible, lightweight *Teflon*® PTFE hose assembly conveying chemicals that permeate aggressively, or for harsh atmospheric conditions that require extreme corrosion resistance on the exterior of the assembly.

Fittings



Fitting Materials

- | | |
|---------------|----------------------|
| Carbon Steel | 316 S.S. |
| Solid Teflon® | Teflon® Encapsulated |
| Solid Kynar® | Solid Polypropylene |
| Monel® | Hastelloy® |

(consult factory for availability)

External Protective Accessories

See Page 35.

Nominal Size		Hose ID		Hose OD		Bend Radius		Weight lbs./ft.	Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM		PSIG	BAR	PSIG	BAR		
1/2	15	0.500	12.7	0.960	24.9	2	50.8	0.17	500	34.5	2500	172.4	08-CKB-W	08-CKB-B
3/4	20	0.740	18.8	1.250	31.8	2.5	69.9	0.26	500	34.5	2500	172.4	12-CKB-W	12-CKB-B
1	25	1.005	25.5	1.560	39.6	6	101.6	0.42	500	34.5	2500	172.4	16-CKB-W	16-CKB-B
1-1/2	40	1.505	38.2	2.240	56.9	10	152.4	0.74	375	25.9	1875	129.3	24-CKB-W	24-CKB-B
2	50	2.005	50.9	2.670	67.8	12	190.5	0.82	375	17.2	1875	86.2	32-CKB-W	32-CKB-B

CPB—Convuluted Polypropylene Braided

Inner core: "Seamless" convuluted *Teflon*® PTFE
Reinforcement: Blue polypropylene, UV-stabilized braid

Construction

Extra-thick natural or conductive "seamless" helical convuluted *Teflon*® PTFE liner braided with thick, high density, polypropylene braid.

Benefits

- Open-pitched, helical convolutions for easy cleaning
- Rated for both medium pressure and full vacuum applications
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore alternatives
- Abrasion resistant braid
- Reduced risk of hand injury from metal braids
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

Applications

For pharmaceutical, chemical, food and beverage, and other applications requiring an extremely flexible, lightweight *Teflon*® PTFE hose assembly, with better abrasion resistance than metal braids.

Fittings



See CPBF (Page 23) for "Flared Through" assemblies.

Fitting Material Availability

Carbon Steel	304/316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

External Protective Accessories

See page 39

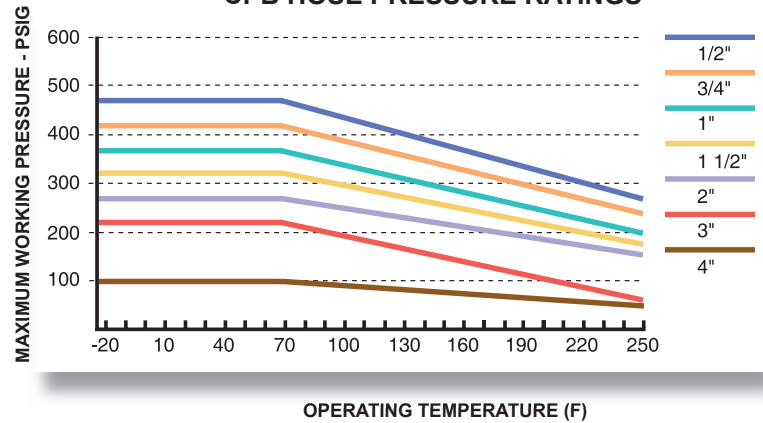


(natural liner shown)



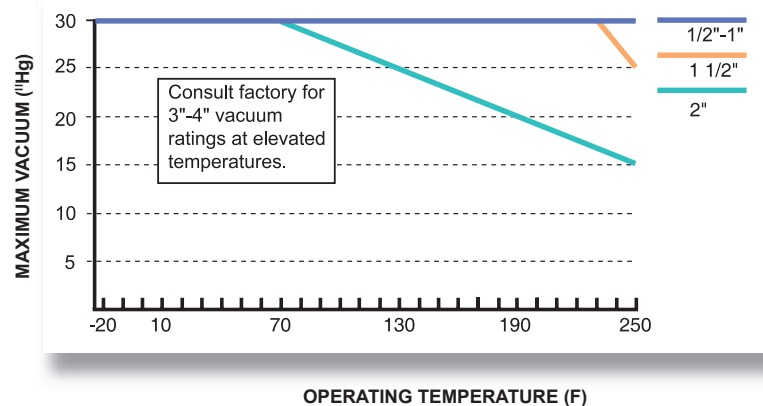
Optional Wire Wrap

CPB HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings.

CPB HOSE VACUUM RATINGS

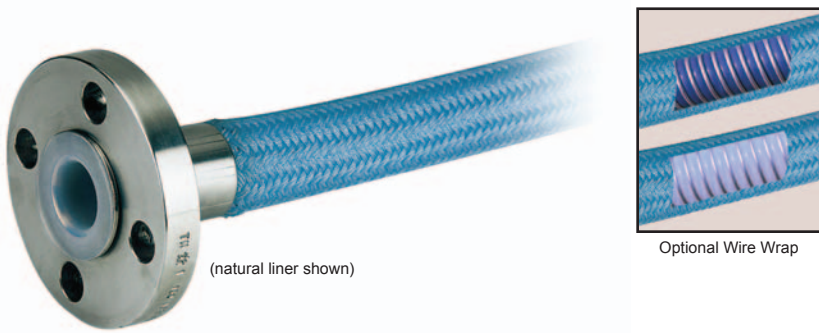


OPERATING TEMPERATURE (F)

Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.470	11.9	0.855	21.7	2	50.8	475	32.7	1900	131	08-CPB-W	08-CPB-B
3/4	20	0.720	18.3	1.160	29.5	2.75	69.9	425	29.3	1700	117.2	12-CPB-W	12-CPB-B
1	25	0.970	24.6	1.440	36.6	4	101.6	375	25.8	1500	103.4	16-CPB-W	16-CPB-B
1-1/2	40	1.540	39.1	2.155	54.7	6	152.4	325	22.4	1300	89.6	24-CPB-W	24-CPB-B
2	50	1.970	50.0	2.560	65.0	7.5	190.5	275	19	1100	75.8	32-CPB-W	32-CPB-B
3	75	2.913	74.0	3.922	99.6	14	355.6	225	15.5	900	62	48-CPB-W	48-CPB-B
4	100	3.937	100.0	5.221	132.6	16	406.4	100	6.9	400	27.6	64-CPB-W	64-CPB-B

CPBF - Convoluted Polypropylene Braided Flared-Through



Inner core: “Seamless” convoluted *Teflon*® PTFE
Reinforcement: Blue polypropylene, UV-stabilized braid

Construction

Extra-thick natural or conductive “seamless” helical convoluted *Teflon*® PTFE liner braided with thick, high denier, polypropylene braid. The liner is passed through the inside of the fitting and flared over the face, creating a self-gasketing sealing surface.

Benefits

- Open-pitched, helical convolutions for easy cleaning
- “Flared Through” system allows *Teflon*® PTFE protection of all wetted surfaces
- Eliminates bacteria traps
- Fitting-to-hose crevices are also eliminated, thereby increasing flow rates
- Optional external vacuum wire provides increased crush resistance and vacuum capability.

Applications

For pharmaceutical, chemical, food and beverage, or any application requiring an extremely flexible, lightweight *Teflon*® PTFE hose with no metal exposure to the media.

Fittings



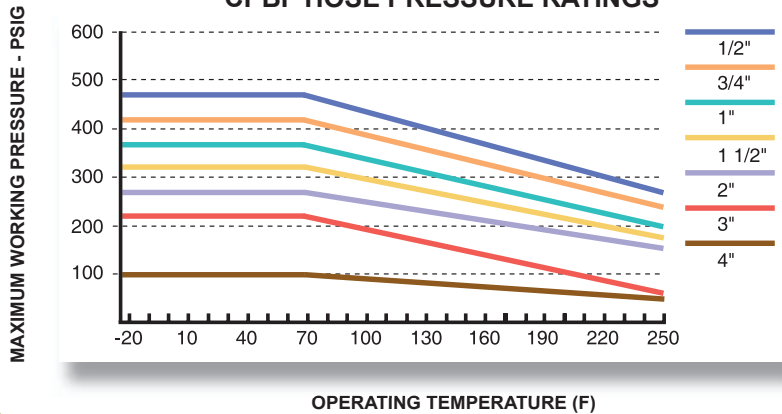
Fitting Material Availability

Carbon Steel	304/316 S.S.
Solid <i>Teflon</i> ®	<i>Teflon</i> ® Encapsulated
Solid Kynar®	Solid Polypropylene
Monel®	Hastelloy®

External Protective Accessories

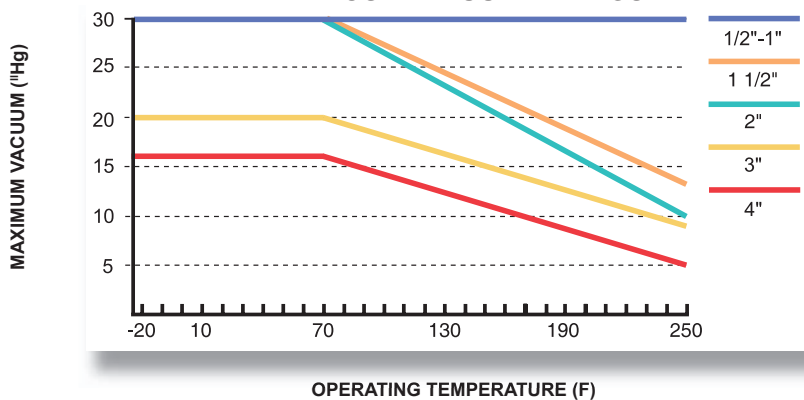
See Page 35.

CPBF HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings.

CPBF HOSE VACUUM RATINGS



Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Natural Part Number	Conductive Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR		
1/2	15	0.470	11.9	0.855	21.7	2	50.8	475	32.7	1900	131	08-CPB-W	08-CPB-B
3/4	20	0.720	18.3	1.160	29.5	2.75	69.9	425	29.3	1700	117.2	12-CPB-W	12-CPB-B
1	25	0.970	24.6	1.440	36.6	4	101.6	375	25.8	1500	103.4	16-CPB-W	16-CPB-B
1-1/2	40	1.540	39.1	2.155	54.7	6	152.4	325	22.4	1300	89.6	24-CPB-W	24-CPB-B
2	50	1.970	50.0	2.560	65.0	7.5	190.5	275	19	1100	75.8	32-CPB-W	32-CPB-B
3	75	2.913	74.0	3.922	99.6	14	355.6	225	15.5	900	62	48-CPB-W	48-CPB-B
4	100	3.937	100.0	5.221	132.6	16	406.4	100	6.9	400	27.6	64-CPB-W	64-CPB-B

SHBT – Smooth Bore Chlorine/Bromine Transfer Hose Assembly

- > **Inner core:** “Seamless” conductive smoothbore *Teflon*® PTFE
- Reinforcement:** Hastelloy® C276 braid
- External Protection:** HDPE plastic spiral guard

Construction

Extra-thick conductive “seamless” smoothbore *Teflon*® PTFE liner braided with Hastelloy® C276 heavy gauge wire braid, and HDPE spiral guard as a protective cover (per the Chlorine Institute pamphlet 6 instructions.)

Benefits

- Meets Chlorine Institute Pamphlet 6 instructions
- Smoothbore liner has significantly less surface area than convoluted liner - that means reduced permeation.
- Rated for full vacuum
- Designed to handle the rigors of everyday handling at chlorine transfer stations
- Crush resistant and easy to flex

Applications

For use in Chlorine/Bromine transfer to 1-ton cylinders (CGA 820 fitting). These assemblies meet or exceed the Chlorine Institute’s pamphlet 6 recommendations for transfer of chlorine or bromine.

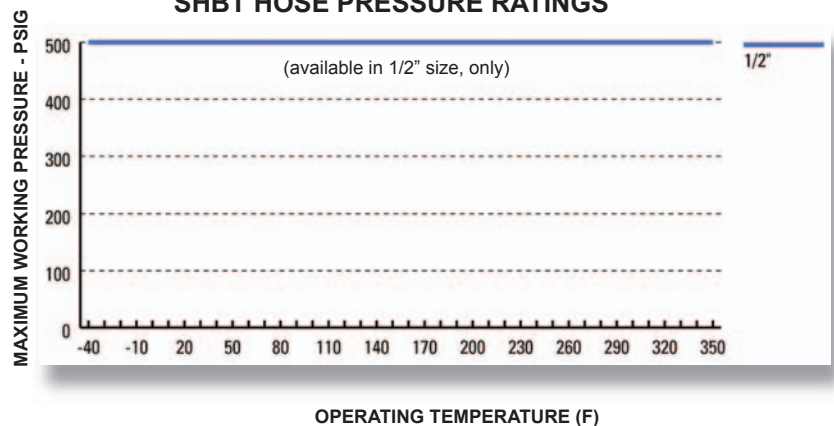
Fittings



Monel® fittings standard

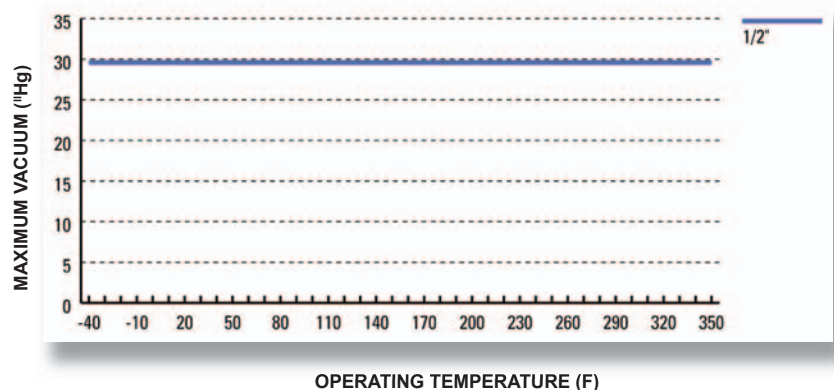


SHBT HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings.

SHBT HOSE VACUUM RATINGS



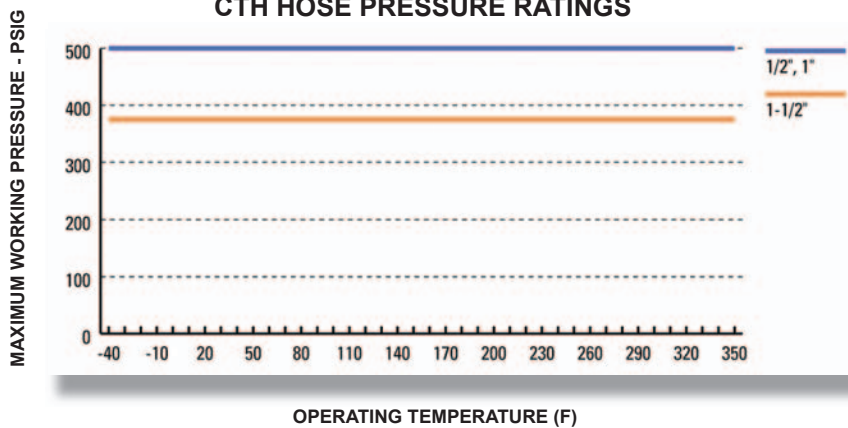
Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Assembly Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR	
1/2	15	0.470	11.9	0.748	19.0	2	50.8	500	34.5	2500	172.4	See pages 46-47

CTH - Convoluted Bore Chlorine/Bromine Transfer Hose (Hastelloy)

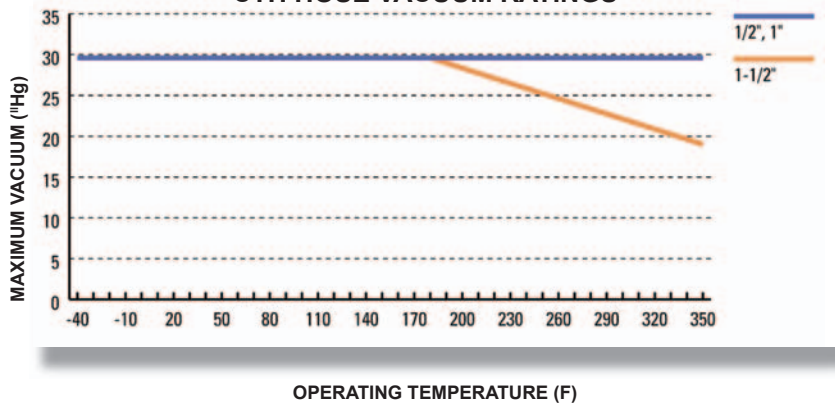


CTH HOSE PRESSURE RATINGS



NOTE: Hose assembly pressure ratings may be limited by the fittings.

CTH HOSE VACUUM RATINGS



Note: Vacuum ratings are based on testing done on straight assemblies. Bent assemblies may have reduced vacuum resistance.

- Inner core:** "Seamless" conductive convoluted *Teflon*® PTFE
- Reinforcement:** Hastelloy® C276 braid or *Kynar*® double braid
- External Protection:** HDPE plastic spiral guard

Construction

Extra-thick, natural or conductive "seamless" helical convoluted *Teflon*® PTFE liner braided with Hastelloy® C276 heavy gauge wire braid, and HDPE spiral guard as a protective cover (per the Chlorine Institute pamphlet 6 instructions.)

Benefits

- Meets Chlorine Institute Pamphlet 6 instructions
- Open-pitched, helical convolutions for easy cleaning
- Rated for full vacuum
- Designed to handle the rigors of everyday handling at chlorine transfer stations
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore alternatives

Applications

For use in Chlorine/Bromine transfer from rail cars, trucks, and 1-ton cylinders (CGA 820 fitting). These assemblies meet or exceed the Chlorine Institute's pamphlet 6 recommendations for transfer of chlorine or bromine. (See *Permeation*, page 37.)

Fittings



Threaded



Flanged (300 lb.)

Monel® fittings standard

Nominal Size		Hose ID		Hose OD		Bend Radius		Max. Working Pressure at 70°F (21°C)		Burst Pressure at 70°F (21°C)		Assembly Part Number
Inch	DN	Inch	MM	Inch	MM	Inch	MM	PSIG	BAR	PSIG	BAR	
1/2	15	0.470	11.9	0.748	19.0	2	50.8	500	34.5	2500	172.4	See pages 46-47
1	25	0.970	24.6	1.354	34.4	4	101.6	500	34.5	2500	172.4	See pages 46-47
1-1/2	40	1.540	39.1	2.034	51.7	6	152.4	375	25.9	1875	129.3	See pages 46-47

Sanitary Tri-Clamp® and Mini Sanitary

Tri-Clamp®

Surface finishes meets or exceeds FDA, USDA, and 3A standards. 25 Ra to custom electropolishing available

Tri-Clamp® Part # Examples

- SAN-08X08-SS Tri-Clamp
- SAN-08X12-SS Tri-Clamp 1 Step
- SAN-08X16-SS Tri-Clamp 2 Step
- SAN-08X24-SS Tri-Clamp 3 Step

Standard Sizes Available

1/2" - 08X08*	1"	16X24
1/2" - 08X12*	1"	16X32
1/2" - 08X16*	1-1/2"	24X24
1/2" - 08X24*	1-1/2"	24X32
3/4" - 12X12	2"	32X32
3/4" - 12X16	3"	48X48
3/4" - 12X24	4"	64X64
1" - 16X16		

Size = (Hose Shank X Fitting)
Other jump sizes and elbow fittings available.

Standard Material

SS - 316 Stainless Steel
TEF - *Teflon*® PFA Encapsulated

Custom Material

K - Kynar®
M - Monel®
ST - Solid *Teflon*®



*Not available in *Teflon*® Encapsulated

NOTE: Gaskets and clamping devices will ultimately decide the pressure rating of these fittings. Consult the manufacturer of each to determine final working pressures.

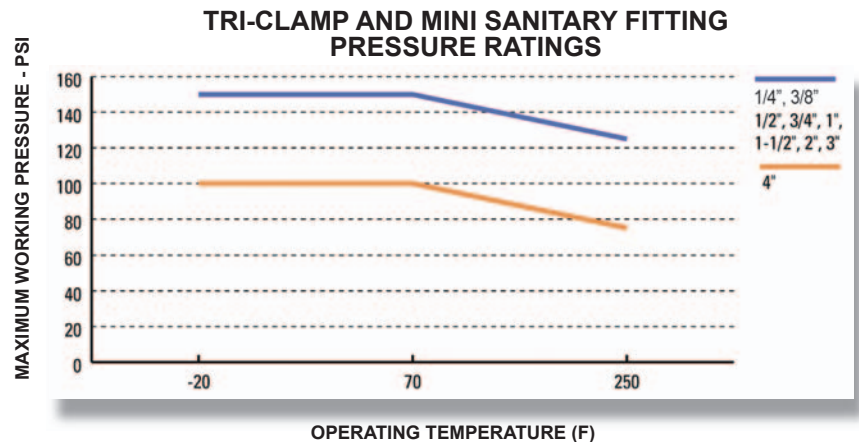


Tri-Clamp®

90° Elbow

45° Elbow

Flared-Through Available



Mini Sanitary (also available in elbows and flared-through)

Surface finishes meet or exceed FDA, USDA, and 3A standards. Custom finishes available upon request.

Mini Sanitary Part # Example

- MSAN-08X08-SS
- MSAN-08X12-SS Tri-Clamp 1 Step
- MSAN = Mini Sanitary

Standard Sizes Available

1/4" = - 04	1/2" - 08
3/8" = - 06	3/4" - 12

Standard Material

SS - 316 Stainless Steel

Custom Material

K - Kynar®
M - Monel®
H - Hastelloy®
ST - Solid *Teflon*®



Mini Sanitary
(elbows available)



Sanitary I-Line[®] and Bevel Seat

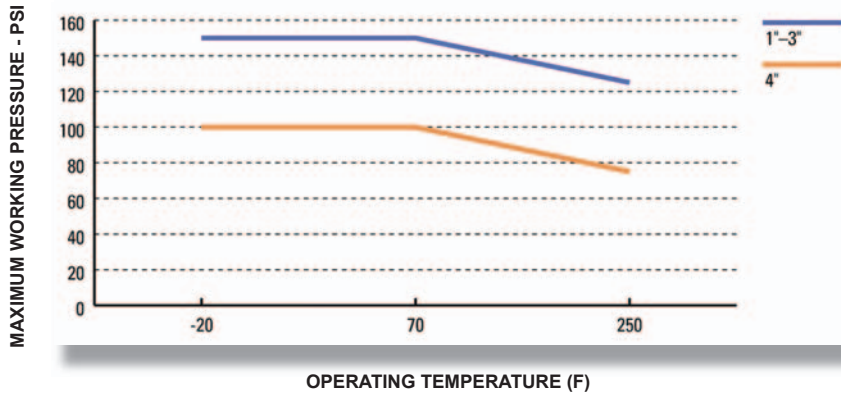


Female I-Line[®]



Male I-Line[®]

I-LINE AND BEVEL SEAT FITTING PRESSURE RATINGS



NOTE: Gaskets and clamping devices will ultimately decide the pressure rating of these fittings. Consult the manufacturer of each to determine final working pressures.



Female Bevel Seat



Male Bevel Seat

Flared-Through Assemblies Available with I-Line and Bevel Seat Fittings

I-Line[®]

Surface finishes meets or exceeds FDA, USDA, and 3A standards. Custom finishes available upon request.

Sanitary I-Line[®] Part # Example:

MIL-16-SS

MIL = Male I-Line

FIL = Female I-Line

Sizes Available

1" - 16	3" - 48
1-1/2" - 24	4" - 64
2" - 32	

Standard Material

SS - 316 Stainless Steel

Custom Material

M - Monel[®]

H - Hastelloy[®]

Bevel Seat

Surface finishes meets or exceeds FDA, USDA, and 3A standards. Custom finishes available upon request.

Sanitary Bevel Seat Part # Example:

MBS-16-SS

MBS = Male Bevel Seat

FBS = Female Bevel Seat

Sizes Available

1" - 16	2" - 32
1-1/2" - 24	

Standard Material

SS - 316 Stainless Steel

Custom Material

M - Monel[®]

H - Hastelloy[®]

Cam & Groove

Female/Male Cam Insert

Standard insert: Solid metal or plastic

Teflon® PFA encapsulated: Injection molded high purity PFA Teflon® over entire hose shank and throughout wetted areas of fitting

Teflon® PTFE flared-through: Hose liner extends throughout the insert and is flared over the face under the cam gasket on the female cam only

Cam & Groove

Part # Example: FCG-08-SS

FCG = Female Cam & Groove (swivel)
 FCGL = Female Cam & Groove (swivel) with locking handles
 MCG = Male Cam & Groove

Sizes Available

1/2" - 08*	2" - 32
3/4" - 12	3" - 48
1" - 16	4" - 64**
1-1/2" - 24	

Standard Insert Material

SS – 316 Stainless Steel
 TEF – Teflon® PFA Encapsulated

Custom Insert Material

H - Hastelloy®
 K - Kynar®
 M - Monel®
 PP - Polypropylene

* 1/2" hose with actual 3/4" cam fitting
 ** Not available in Teflon® Encapsulated

Rotating Female Cam Body

316 SS is standard. Custom materials are available. Female cams are available with standard or locking handle systems.

Female Cam Body Options

SS - 316 Stainless Steel

Female Cam Body Custom Options

H - Hastelloy®
 K - Kynar®
 M - Monel®
 PP - Polypropylene



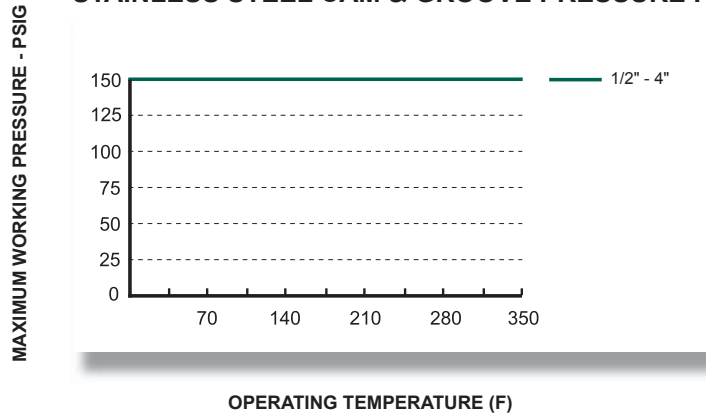
Stainless Steel Cam & Groove
(Locking Handles Standard)



Teflon® PFA Encapsulated Cam & Groove
(Conductive liner available)



STAINLESS STEEL CAM & GROOVE PRESSURE RATINGS



NOTE: Liquid service only.



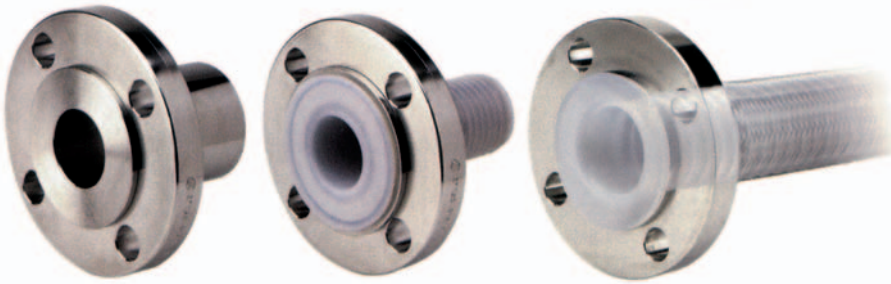
Flange X Cam Adapter PFA Encapsulated

Sizes available: 3/4" through 3", rotating flanges all materials (see page 42-43).

Available Flange X Male Cam and Flange X Female Cam.

Consult factory for information.

Flanged (Rotating)



Standard retainer:
Solid metal or plastic

Teflon® PFA encapsulated:
Injection molded high purity Teflon® PFA over entire hose shank and throughout wetted areas of fitting

Teflon® PTFE flared-through:
Hose liner extends through the retainer and is flared over the face

Rotating Flanges

150# and 300#

Part # Example: FR-08-SS

FR = Flange Retainer

Sizes Available

1/2" - 08*	2" - 32
3/4" - 12	3" - 48
1" - 16	4" - 64*
1-1/2" - 24	

Standard Material

FT – Flared Through
H – Hastelloy®
M – Monel®
SS – 316 Stainless Steel
TEF – Teflon® Encapsulated

Custom Material

K - Kynar®
CP - CPVC
PP - Polypropylene
ST - Solid Teflon®

Flange Option: 150# and 300#

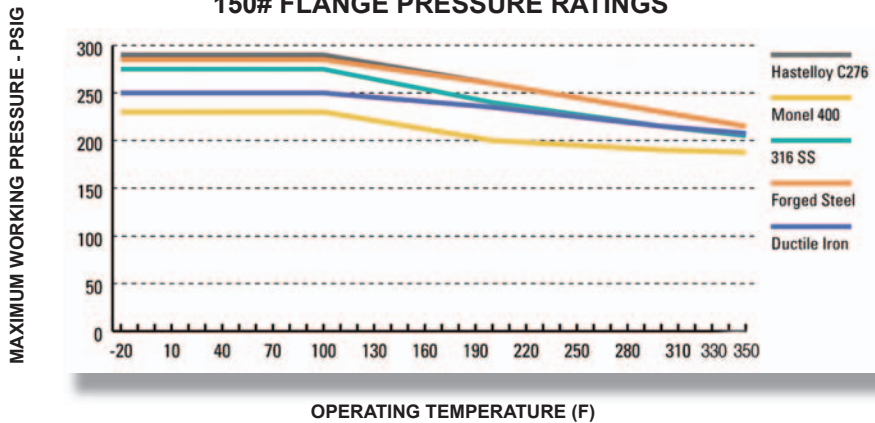
DI – Ductile Iron
E – Carbon Steel Epoxy Coated
M – Monel®
SS – 316 Stainless Steel

Custom Flange Option

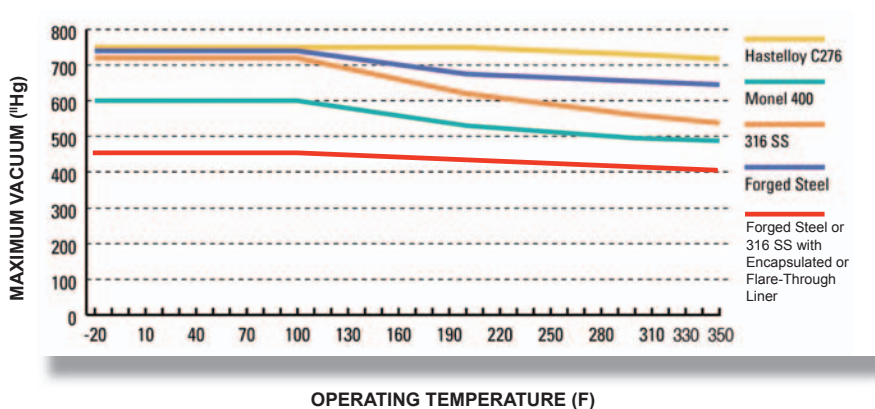
H - Hastelloy®
K - Kynar®
P – PVDF
PP - Polypropylene
ST - Solid Teflon®

*Not available in Teflon® Encapsulated

150# FLANGE PRESSURE RATINGS



300# FLANGE PRESSURE RATINGS



Ductile Iron



Plastic



Stainless



Epoxy Coated
Carbon Steel

Female JIC

Female JIC Swivel

- Joint Industrial Conference SAEJ514 specifications
- 37° JIC metal-to-metal sealing

JIC

Part # Example: FJX-08-SS

FJX = JIC Female Swivel

Sizes Available

- 1/4" - 04
- 3/8" - 06
- 1/2" - 08
- 3/4" - 12
- 1" - 16
- 1 1/2" - 24
- 2" - 32

Standard Material

- CS – Carbon Steel
- SS – 316 Stainless Steel

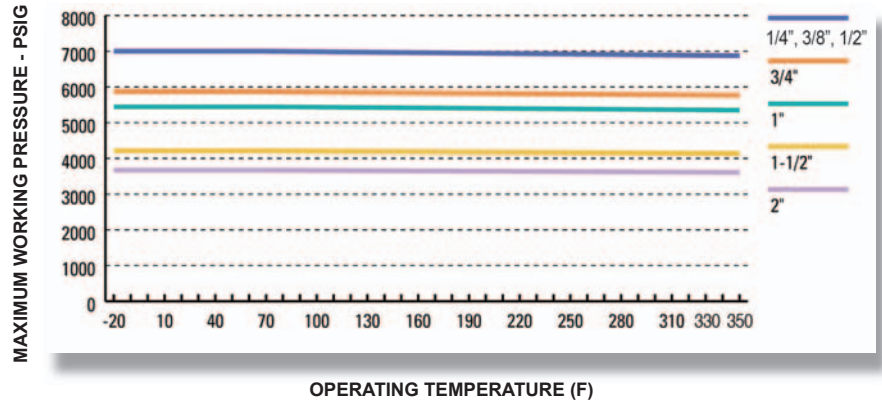
Custom Material*

- H - Hastelloy®
- M - Monel®

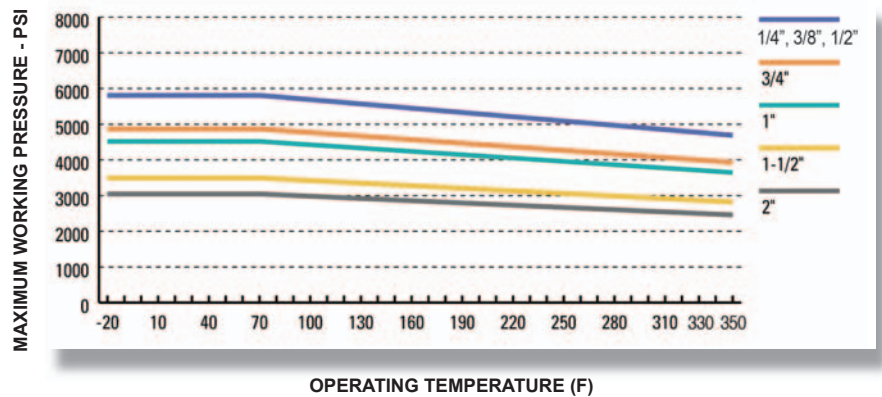
- * Mixed combinatoin fittings available:
 Standard – Nut and insert same material
 Combination – Nut and insert different
 Example: Hastelloy® insert with 316 SS nut



FEMALE JIC STAINLESS FITTINGS
PRESSURE RATINGS



FEMALE JIC MONEL FITTINGS
PRESSURE RATINGS

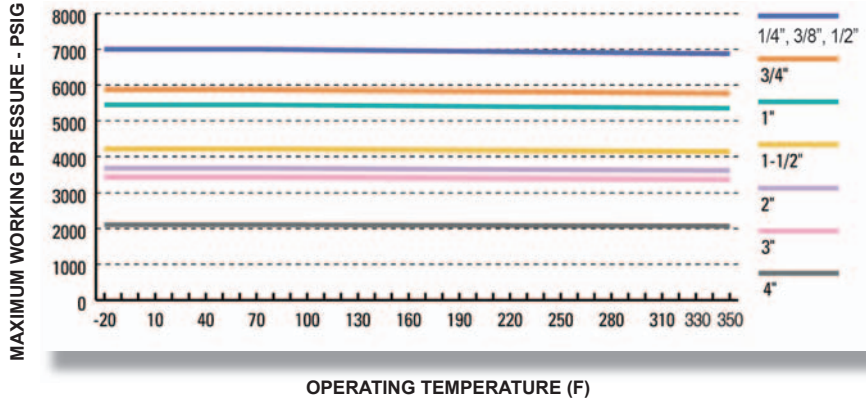




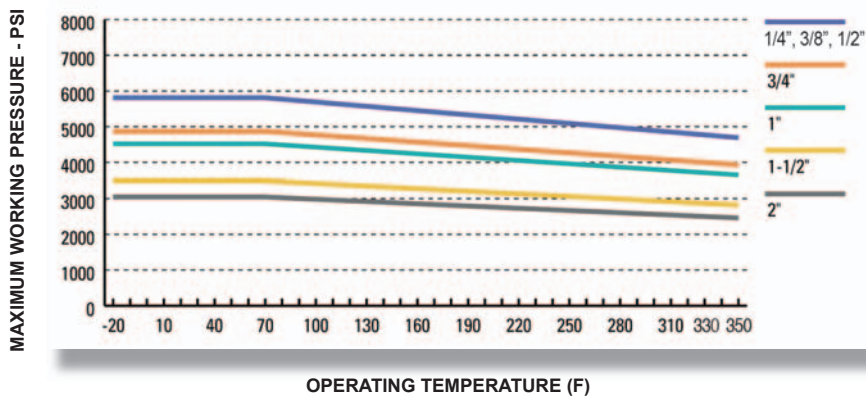
Pipe Thread Fittings



316 SS MALE AND FEMALE NPT FITTINGS PRESSURE RATINGS



MONEL 400 MALE AND FEMALE NPT FITTINGS PRESSURE RATINGS



Male/Female Rigid NPT

NPT: American National Standard

Optional: JIS, BSPT and metric standards

NPT

Part # Example: MP-08-SS

MP = Male Pipe Rigid Hex

FP = Femal Pipe Rigid Hex

Sizes Available

- 1/4" - 04
- 3/8" - 06
- 1/2" - 08
- 3/4" - 12
- 1" - 16
- 1 1/2" - 24
- 2" - 32
- 3" - 48
- 4" - 64

Standard Material

SS – 316 Stainless Steel

M - Monel®

CS – Carbon Steel

Custom Material

H - Hastelloy®

K - Kynar®

PP - Polypropylene



Custom materials available.

Compression Tube

- Compression Tube Adapter/Connector**
 - Tube adapter plain or with nut and ferrule
 - Tube connector plain or with nut and ferrule

- Compression Tube Part # Example: TUBEC-08-SS**

TUBEC = Tube Connector
 TUBECX = Tube Connector with Nut and Ferrule
 TUBEA = Tube Adapter
 TUBEAX = Tube Adapter with Nut and Ferrule

- Sizes Available**

- 1/4" - 04
- 3/8" - 06
- 1/2" - 08
- 3/4" - 12
- 1" - 16

- Standard Material**

SS – 316 Stainless Steel

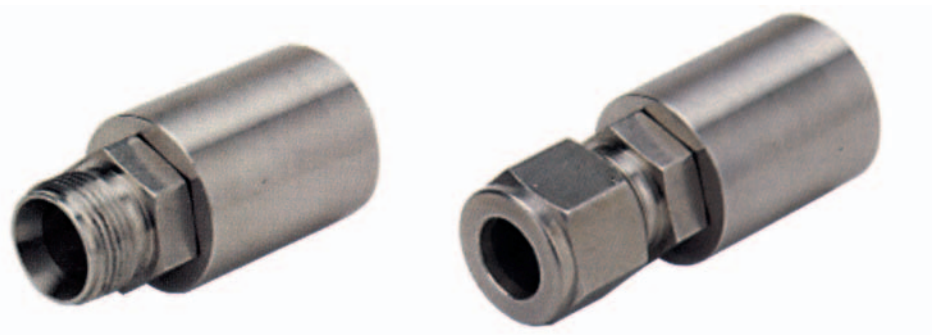
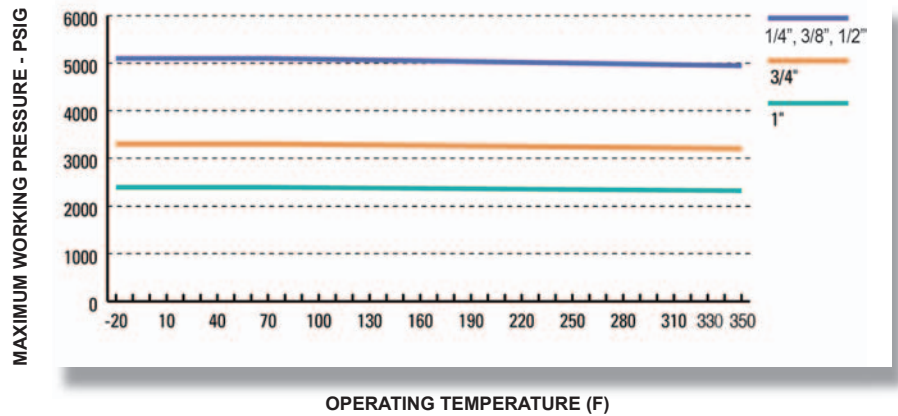
- Custom Material***

- H - Hastelloy®
- M - Monel®



Tube Adapter

316 SS COMPRESSION FITTINGS PRESSURE RATINGS



Tube Connector

Tube Connector with Nut and Female



Butt Weld



Butt Weld Fittings

- Schedule 5, 10, and 40 pipe
- Sanitary O.D. tube
- Extra-long lengths available

Butt Weld

Part # Example: BWP5-08-SS

BWP5 = Sch. 5 Butt Weld Pipe
 BWP10 = Sch. 10 Butt Weld Pipe
 BWP40 = Sch. 40 Butt Weld Pipe
 BWT = Butt Weld Tube

Sizes Available

- 1/4" - 04
- 3/8" - 06
- 1/2" - 08
- 3/4" - 12
- 1" - 16
- 1 1/2" - 24
- 2" - 32
- 3" - 48
- 4" - 64

Standard Material

SS - 316 Stainless Steel

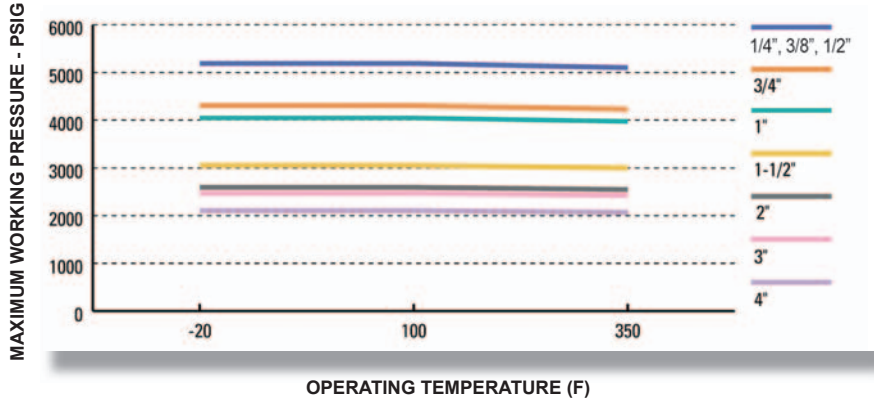
Custom Material

CS - Carbon Steel
 H - Hastelloy®
 M - Monel®

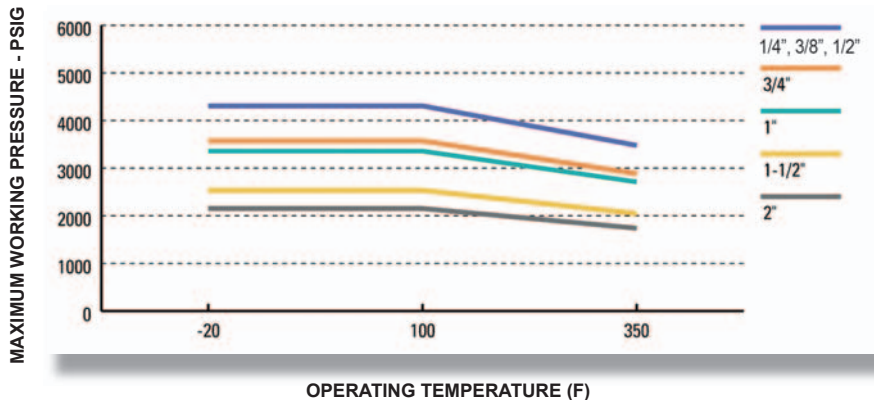
* Available pipe only.

Note: Butt weld fittings are available for purchase as bulk fittings, only, and are not available on factory-made assemblies.

316 SS BUTT WELD FITTINGS PRESSURE RATINGS



MONEL 400 BUTT WELD FITTINGS PRESSURE RATINGS





Adapter Fittings

Reducing Flanges

■ PTFE, PVDF, or Polypropylene-Lined

- Available in stainless steel and other alloys
- Available in ANSI, DIN, JIS, and other drillings.



PTFE-Lined
Reducing Flange

Sanitary Adapters

■ PTFE and PFA-Lined

- Straight or reducing
- Tri-Clamp, I-Line, Bevel Seat x Flange, Cam-Lock and other connections

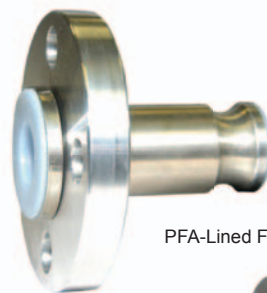


PTFE-Lined Female I-Line x Male I-Line Reducer

Flange Adapters

■ PTFE and PFA-Lined

- Available in stainless steel and other alloys
- ANSI, DIN, JIS, and other drillings x sanitary, camlock and other connections.



PFA-Lined Flange x Male Cam Lock



PTFE-Lined Flange x Tri-Clamp

Accessories & Options

Anti-Kink Guard

■ Stainless Steel Heavy Duty Anti-Kink Armor Guard

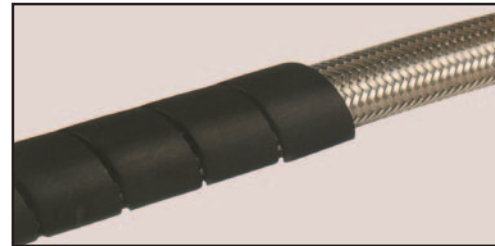
- Entire length
- End protectors any length



HDPE Spiral Guard

■ High Density Polyethylene Spiral Cut Sleeve

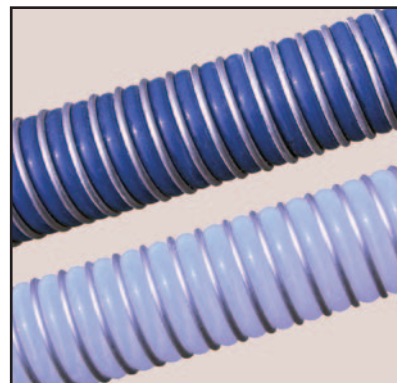
- Entire length
- End protectors any length
- Standard black color (other colors available)



External Vacuum Wire

■ Vacuum Wire for Convoluted Hoses

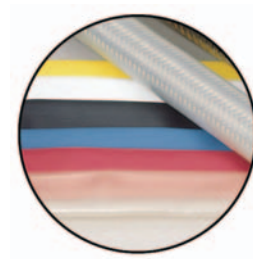
- Entire length
- Available for any convoluted hose (standard on Twister™ CRC hose)
- Provides Increased Crush and Vacuum Resistance
- Reduced pressure handling capability in some hose in some hose styles (consult factory)



Heat Shrink Sleeve

■ Polyolefin Heat Shrink

- Entire length
- Color coded special lengths
- Multiple colors available





Qualification Testing

Resistoflex has a more vigorous quality assurance program than any other hose manufacturer. The following tests are performed on 100% of our hoses, ensuring that every unit meets performance specifications.

> Resistoflex Qualification Testing

1.0 Test Method

1.1 *Qualification Tests:* Hoses lined with Teflon® shall be capable of passing qualification tests designed to demonstrate the hose's ability to withstand severe operating conditions. Once a hose design has passed qualification testing, re-testing is not required. If the manufacturer changes the hose design, however, the new design must be re-tested. The hose manufacturer shall make hose qualification test reports available upon request. Qualification testing is as follows:

1.1.1 *Burst Testing:* Subject hose to destructive burst test to determine allowable operating pressure and proof test pressure.

- 1.) Install hose on test stand, Introduce hydraulic fluid into hose, purge all air.
- 2.) Pressurize at an approximate rate of 100 psi/sec. until hose fails.
- 3.) Record burst pressure.
- 4.) Allowable operating pressure is defined as 25% of burst pressure for a 4:1 safety factor.
- 5.) For Chlorine Transfer Hose, allowable operating pressure is 20% of burst pressure for a 5:1 safety factor.

Note: Allowable operating pressure is also known as "rated working pressure" and "working pressure."

1.1.2 *Steam-Cold Water Cycling:* Subject representative Teflon®-lined hose samples to steam-cold water cycling to determine the ability of the lined hoses to withstand rapid temperature changes. Procedure is as follows:

- 1.) Install hose on closed-loop test stand and circulate saturated steam at 125±5 psig (50 psig for TRC hose) until the skin temperature varies no more than ±2.5°F for 10 minutes. Temperature shall be measured by a thermocouple attached to the crimp collar.
- 2.) Close off the steam and immediately circulate water at a maximum temperature of 77°F until the skin temperature reaches 122°F.
- 3.) Vent and introduce air to purge the test hose for a minimum of one minute to completely drain hose of water.
- 4.) Repeat steps 1-3 for a total of 100 cycles.
- 5.) During the 100 cycles, leakage is cause for rejection.

1.1.3 *Impulse Testing:* Subject hose assemblies to rapid and frequent pressure cycling to determine hose assembly's ability to withstand long-term pressure cycling. (Note:

impulse testing is not required for TR or TMH)

- 1.) Install hose on test stand and pressurize hose with hydraulic fluid to 125% of rated working pressure, return to ambient pressure, return to 125% of rated working pressure. This is defined as one cycle.
- 2.) Continue at a rate of approximately 70 cycles/min. until 50,000 cycles have been completed. (100,000 cycles for TRC non flare-through)
- 3.) During the test, any leakage is cause for rejection.

1.1.4 *Vacuum Testing:* Subject representative hose assemblies to vacuum conditions to determine rated vacuum for hose at a given temperature.

- 1.) Seal assembly ends with modified fittings and the desired vacuum/temperature level and hold for 48 hrs.
- 2.) At the end of the 48 hrs. turn off the oven and allow the hose to cool to ambient temperature while still under the same vacuum level.
- 3.) Remove the hose and inspect for buckling or collapse of the liner. Any buckling or collapse of the liner shall be cause for rejection.
- 4.) If no collapse or buckling has occurred, the vacuum and temperature shall be considered acceptable.

1.2 *Proof Testing for Customer Orders:* 100% of finished hose assemblies shall be proof tested.

1.2.1 Factory-made assemblies shall be proof tested hydrostatically at 1.5 times rated working pressure and/or pneumatically tested (submerged in water) at 1 times rated working pressure. Chlorine Transfer Hose is proof tested at 2 times rated working pressure according to the Chlorine Institute recommendations. TR and TMH are not pneumatically tested.

1.2.2 Hose assemblies made at an Authorized Fabricating Distributor location shall be hydrostatically or pneumatically proof tested. (TR and TMH are fabricated at the factory, only)

2.0 Quality Documentation

2.1 Manufacturer's design, engineering, manufacturing, sales, and service shall be certified to ISO 9001.

Permeation

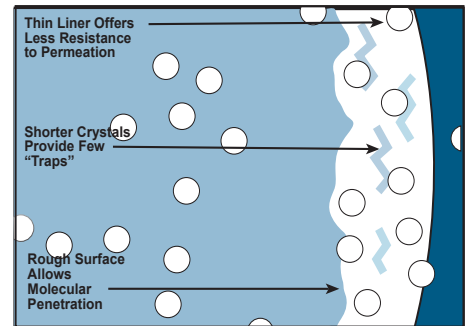
Permeation is a process in which one material, usually a gas, diffuses into and through a solid barrier. All materials are permeable to a degree. The permeation of fluoropolymers in lined hose and piping systems is an important consideration because of the conditions under which they operate and the fluids they are meant to contain.

Many variables effect permeation rates through fluoropolymers. These can be broken into categories as follows:

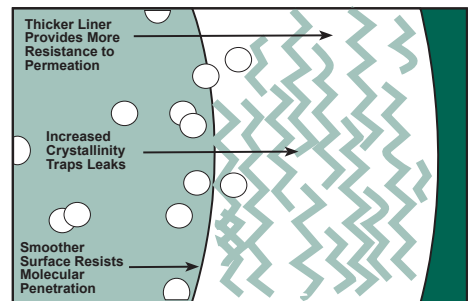
1. Type of fluoropolymer and its associated molecular structure. PVDF, PFA, and PTFE all have different permeability, which is dependent upon all the other variables
2. The way in which the polymer is processed and its physical state – polymer crystallinity and liner thickness have a profound impact on permeability
3. The permeant itself – the smaller the molecule and greater its polarity, the faster it is likely to permeate through fluoropolymers.
4. Operating and environmental parameters – temperature and pressure have direct correlation to permeation rates. Temperature differential between process and the pipe wall also impacts permeation rates.

Fluoropolymers are sometimes viewed as more permeable than other plastics. This view arises in part because fluoropolymers, especially PTFE, are used at higher temperatures and carry more aggressive fluids than other types of materials are capable of.

When conditions are favorable for permeation to occur, it is important to minimize the contributing variables, provide a vent path for permeants to escape, and use exterior materials resistant to the permeant.



A thin liner and manufacturing shortcomings lead to most permeation problems



A thick liner and advanced manufacturing techniques give Resistoflex hose superior permeation resistance.

Levels of Resistivity

Surface Resistivity (Ohms/Square)	Range of Conductivity	Material Category
10^{10}	—	PTFE Electrically Insulating
10^{13}	—	
10^{12}	—	
10^{11}	—	
10^{10}	—	Antistatic Range
10^9	—	
10^8	—	
10^7	—	
10^6	—	Conductive Range
10^5	—	
10^4	—	
10^3	—	
10^2	—	
10^1	—	
10^0	—	
10^{-1}	—	Carbon Powder & Fibers
10^{-2}	—	
10^{-3}	—	
10^{-4}	—	Metals
10^{-5}	—	

Static Electricity Considerations for Fluoropolymer Lined Hoses

Static Electricity Considerations

Electrostatic Discharge is a sudden flow of electric current through a material that is normally an insulator. As certain liquids flow through PTFE lined hoses, static charge generation can occur. These charges accumulate when they are not dissipated as fast as they are generated. Electrostatic discharge occurs when the potential difference between the liner and ground generates such a strong electric field that the liner's atoms turn into current conducting ions. The energy is then released through this newly formed conductor in the form of an electric spark.

Charge generation depends upon the potential of the hose to accept or donate electrons, the fluid and its velocity, and the conductivity of the hose liner. In applications where charge generation is a concern, conductive fluoropolymer liners should be used. The conductive properties of the liner allow the generated charge to be dissipated quickly, reducing the risk of electrostatic discharge.

Properties of Teflon® PTFE T-62 Resin

Resistoflex uses only DuPont Teflon PTFE T-62 resin because of the extraordinary performance it provides.

Properties	Unit	Teflon® PTFE T-62 Copolymer	PTFE Homopolymer	FEP
Continue Service Temp	°F	500°F	500°F	300°F
Tensile Strength	PSI	5,000	3,000	3,000
Flex Life	Cycles	>18,000,000	>1,000,000	5,000



Recommended Bolt Torques for Hoses with Flared-Through Design or Encapsulated Flange Retainers

ANSI Class 150 systems

Lightly oiled A193 B7 bolts and A194 2H nuts

Pipe Size	Bolt Torque (ft-lb per bolt)			
	Flared -Through		PFA Encapsulated	
	Min.	Max.	Min.	Max.
1	8	13	12	17
1.5	19	31	28	41
2	39	65	59	85
3	62	103	93	134
4	40	67	---	---
6	75	124	---	---
8	100	167	---	---

ANSI Class 300 systems

Lightly oiled A193 B7 bolts and A194 2H nuts

Pipe Size	Bolt Torque (ft-lb per bolt)			
	Flared -Through		PFA Encapsulated	
	Min.	Max.	Min.	Max.
1	10	17	15	22
1.5	28	47	42	61
2	20	33	29	42
3	37	62	56	80
4	49	81	---	---
6	50	83	---	---
8	78	130	---	---

NOTE: These maximum torques are only valid for LIGHTLY OILED A193 B7 bolts and A194 nuts. Lightly oiled is considered lubrication with WD-40* or equivalent. The maximum recommended torque values are suggested for lined systems operating at or near the maximum recommended pressures and temperatures. Systems operating under less severe conditions can in general experience leak-free performance using lower torque values. Additionally, anytime gaskets or spring type washers are used, we suggest using the minimum recommended torque value and that the torque be increased only to obtain satisfactory sealing. For systems that will require frequent disassembly, we suggest using the minimum recommended torque value initially to avoid distortion of the plastic face.

*WD-40 is a registered trademark of WD-40 Company, San Diego, CA.

NOTE: For metal flanged joints, where the hose liner does not form the gasket, use the bolt torques specified by the manufacturer of the gaskets to be used.

> Related Definitions

Rated Working Pressure: Maximum operating pressure at which the hose may operate through the stated bending range.

Proof Test Pressure: Not to exceed 1-1/2 times rated working pressure. Chlorine Transfer Hose proof test pressure is 2 times rated working pressure. See page 40 for detailed information.

Burst Pressure: The average pressure at which the hose can be expected to fail at 70°F.

Minimum Bend Radius: The bend radius to which a hose may be bent when no further motion is to be imposed.

Dynamic Bend Radius: The bend radius used in calculations involving applications where the hose is moving. This bend radius has a direct relation to cycle life. Bending the hose in a smaller radius than rated will adversely affect the life of the hose.

Live Length: The length of hose that will bend, or the length of hose between the braid collars (LL).

Overall Length: The total face-to-face length of a straight hose (OAL).

Length Tolerances:	Min.-18" long assemblies	+/- 1/4"
	18"-36" long assemblies	+/- 1/2"
	33"-50" long assemblies	+/- 3/4"
	50" and longer assemblies	+/- 1.5%

> Installation and Motion Considerations

Axial Motion: Motion that occurs when a hose is compressed along its longitudinal axis. Axial motion is only applicable in very short lengths of annular hose only. Plastic lined hose should not be subjected to axial motion.

Lateral Offset Motion: (Fig. 1) Motion that occurs when one end of the hose is deflected in a plane perpendicular to its longitudinal axis with the ends remaining parallel. In offset applications where motion is repeated, the offset should never exceed 25% of the minimum bend radius.

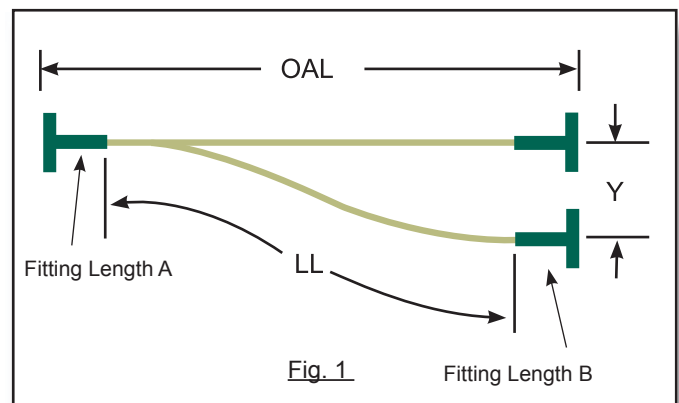
$OAL = LL + \text{Fitting Length A} + \text{Fitting Length B} + (2 \times \text{nominal hose diameter})$

Note: Where offset motion "Y" occurs on both sides of hose centerline, the hose live length should be based on total travel, or 2Y.

Angular Offset Motion: Angular movement is defined as the bending of the hose so that the ends are no longer parallel. Amount of movement is measured in degrees from centerline of the hose.

Radial Motion: This type of movement occurs when the hoses are bent in a 180 degree arc such as in vertical or horizontal loops. In this configuration, two types of movement are possible. One is where the bend radius remains constant and one end of the hose moves parallel to the other end. The other is where the ends move perpendicular to each other so as to enlarge or decrease the width of the loop.

For more consideration on best practices for hose installation and determining the proper length of a hose assembly, please refer to the NAHAD website at www.nahad.org.





Fraction-Decimal and Unit Conversions

Inches		
Fraction	Decimal	Millimeters
1/64	.015625	.3969
1/32	.03125	.7938
3/64	.046875	1.1906
1/16	.0625	1.5875
5/64	.078125	1.9844
3/32	.09375	2.3813
7/64	.109375	2.7781
1/8	.125	3.1750
9/64	.140625	3.5719
5/32	.15625	3.9688
11/64	.171875	4.3656
3/16	.1875	4.7625
13/64	.203125	5.1594
7/32	.21875	5.5563
15/64	.234375	5.9531
1/4	.25	6.3500
17/64	.265625	6.7469
9/32	.28125	7.1438
19/64	.296875	7.5406
5/16	.3125	7.9375
21/64	.328125	8.3344
11/32	.34375	8.7313
23/64	.359375	9.1282
3/8	.375	9.5250
25/64	.390625	9.9219
13/32	.40625	10.3188
27/64	.421875	10.7157
7/16	.4375	11.1125
29/64	.453125	11.5094
15/32	.46875	11.9063
31/64	.484375	12.3032
1/2	.500	12.7001

Inches		
Fraction	Decimal	Millimeters
33/64	.515625	13.0969
17/32	.53125	13.4938
35/64	.546875	13.8907
19/32	.5625	14.2876
37/64	.578125	14.6844
19/32	.59375	15.0813
39/64	.609375	15.4782
5/8	.625	15.8751
41/64	.640625	16.2719
21/32	.65625	16.6688
43/64	.671875	17.0657
11/16	.6875	17.4626
45/64	.703125	17.8594
23/32	.71875	18.2563
47/64	.734375	18.6532
3/4	.75	19.0501
49/64	.765625	19.4470
25/32	.78125	19.8438
51/64	.796875	20.2407
13/16	.8125	20.6376
53/64	.828125	21.0345
27/32	.84375	21.4313
55/64	.859375	21.8282
7/8	.875	22.2251
57/64	.890625	22.6220
29/32	.90625	23.0188
59/64	.921875	23.4157
15/16	.9375	23.8126
61/64	.953125	24.2095
31/32	.96875	24.6063
63/64	.984375	25.0032
1	1.0	25.4001

Measurement Definitions

Length Conversions

Millimeters x .3937 = Inches
 Meters x 39.39 = Inches
 Meters x 3.2808 = Feet
 Meters x 1.09361 = Yards
 Kilometers x 3,280.8 = Feet
 Inches x .0254 = Meters
 Feet x .30480 = Meters
 Yards x .91440 = Meters
 Feet x .0003048 = Kilometers

Weight Conversions

Grams x .03527 = Ounces (Avd.)
 Grams x .033818 = Fluid Oz. (Water)
 Kilograms x 35.27 = Ounces (Avd.)
 Kilograms x 2.20462 = Pounds (Avd.)
 Ounces (Avd.) x 28.35 = Grams
 Fluid Ounces (Water) x 29.57 = Grams
 Ounces (Avd.) x .02835 = Kilograms
 Pounds (Avd.) x .45359 = Kilograms

Pressure Measurements

1 Pound Per Square Inch
 = 144 Pounds Per Square Foot
 = 0.068 Atmosphere
 = 2.042 Inches of Mercury at 62°F
 = 27.7 Inches of Water at 62°F
 = 2.31 Feet of Water at 62°F.

1 Atmosphere
 = 30 Inches of Mercury at 62°F
 = 14.7 Pounds Per Square Inch
 = 2116.3 Pounds Per Square Foot
 = 33.95 Feet of Water at 62°F

1 Foot of Water at 62°F
 = 62.355 Pounds Per Square Foot
 = 0.433 Pounds Per Square Inch

1 Inch of Mercury at 62°F
 = 1.132 Feet of Water
 = 13.58 Inches of Water
 = 0.491 Pounds Per Square Inch.

Column of Water 12 Inches High,
 = 1 Inch in Diameter = .341 Pounds



Temperature Conversion

°C	Given Temp °C or °F	°F	°C	Given Temp °C or °F	°F	°C	Given Temp °C or °F	°F
-46	-50	-58	+57	+135	+275	+160	+320	+608
-43	-45	-49	+60	+140	+284	+163	+325	+617
-40	-40	-40	+63	+145	+293	+166	+330	+620
-37	-35	-31	+66	+150	+302	+168	+335	+635
-34	-30	-22	+68	+155	+311	+171	+340	+644
-32	-25	-13	+71	+160	+320	+174	+345	+653
-29	-20	-4	+74	+165	+329	+177	+350	+662
-26	-15	+5	+77	+170	+338	+179	+355	+671
-23	-10	+14	+79	+175	+347	+182	+360	+680
-21	-5	+23	+82	+180	+356	+185	+365	+689
-18	0	+32	+85	+185	+365	+188	+370	+698
-15	+5	+41	+88	+190	+374	+191	+375	+707
-12	+10	+50	+91	+195	+383	+193	+380	+716
-9	+15	+59	+93	+200	+392	+196	+385	+725
-7	+20	+68	+96	+205	+401	+199	+390	+734
-4	+25	+77	+99	+210	+410	+202	+395	+743
-1	+30	+86	+102	+215	+419	+204	+400	+752
+2	+35	+95	+104	+220	+428	+207	+405	+761
+4	+40	+104	+107	+225	+437	+210	+410	+770
+7	+45	+113	+110	+230	+446	+213	+415	+779
+10	+50	+122	+113	+235	+455	+216	+420	+788
+13	+55	+131	+116	+240	+464	+218	+425	+797
+16	+60	+140	+118	+245	+473	+221	+430	+806
+18	+65	+149	+121	+250	+482	+224	+435	+815
+21	+70	+158	+124	+255	+491	+227	+440	+824
+24	+75	+167	+127	+260	+500	+229	+445	+833
+27	+80	+176	+129	+265	+509	+232	+450	+842
+29	+85	+185	+132	+270	+518	+235	+455	+851
+32	+90	+194	+135	+275	+527	+238	+460	+860
+35	+95	+203	+138	+280	+536	+241	+465	+869
+38	+100	+212	+141	+285	+545	+243	+470	+878
+41	+105	+221	+143	+290	+554	+246	+475	+887
+43	+110	+230	+146	+295	+563	+249	+480	+896
+46	+115	+239	+149	+300	+572	+252	+485	+905
+49	+120	+248	+152	+305	+581	+254	+490	+914
+52	+125	+257	+154	+310	+590	+257	+495	+923
+54	+130	+266	+157	+315	+599	+260	+500	+932

If the given temperature (in the shaded column) is Celsius, read Fahrenheit in the column to the right. If the given temperature (in the shaded column) is Fahrenheit, read Celsius in the column to the left.

Assembly Part Numbers

1/16"	01
1/8"	02
3/16"	03
1/4"	04
3/8"	06
1/2"	08
5/8"	10
3/4"	12
7/8"	14
1"	16
1-1/4"	20
1-1/2"	24
2"	32
2-1/2"	40
3"	48
4"	64
6"	96
8"	99
Special Size	00

Hose Size

Hose Style

Tube Code

Natural (White)	W
Conductive (Black)	B
Platinum-Cured Silicone	S
Special Tube	X

Fitting #1 Style

Fitting #1 Material

Flange #1 Code

Teflon® Encapsulated (Natural)	E
Teflon® Encapsulated (Conductive)	A
316 SS	6
Monel®	M
Hastelloy®	H
Solid Kynar®	K
Solid Teflon®	T
Solid Polypropylene	P
Spec EP/Passivation	Q
15 Ra EP 316SS	R
Carbon Steel	C
Special Material	X
None	0

Industrial Fittings

Male Pipe (NPT)	10
Female Pipe (NPT)	11
Male Pipe Union	12
Male NPT Step-Down	14
Male NPT Step-Up	16
Female Pipe Union	13
Female JIC (Swivel)	15
Male NPT Union Step-Down	17
Male NPT Union Step-Up	19
Female NPT Union Step-Down	18
Tube Connector (Plain)	20
Tube Connector (w/ Nut & Ferrule)	21
Tube Adapter (Plain)	25
Tube Adapter (2/ Nut & Ferrule)	26
Grooved End (Victaulic®)	29
CGA 820 Chlorine One Ton Ftg	23

Flanged

Flange Retainer	30
Flare Through	35
Flange Beaded End (Flare Through TR)	38

Cuffed & Flared SVT Assemblies

Cuffed (Tube OD)	43
Cuffed (Pipe OD)	44
Flared Flange, No Retainer	40

Sanitary

TriClamp®	50
TriClamp® (One Step Up)	51
TriClamp® (Two Steps Up)	52
TriClamp® 45° Elbow	57
TriClamp® 90° Elbow	53
TriClamp® (Flare Through)	54
Mini-Sanitary	55
Mini-Sanitary 45° Elbow	5K
Mini-Sanitary 90° Elbow	5L
Mini Sanitary (Flare through)	56
Mini-Sanitary Step-Up	58
I-Line Male (Flare Through)	59
I-Line Male	60
I-Line Female	61
I-Line Female (One Step Up)	62
I-Line Female (Flare Through)	63
Bevel Seat Male	65
Bevel Seat Female	66
Female RJT Swivel	67
Female SMS Swivel	68
Female DIN Swivel	69

Cam & Groove

Male Cam	70
Female Cam (Step-Up)	75
Female Cam w/ Locking Handle-PT	77
Female Cam w/ Locking Handle-W-Lok	78
Female Cam (Flare Through)	79

Special Fitting

Non-Standard Special	99
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Convuluted

PCT Unbraided (SVT or crimped)	U
WCT Unbraided Conv. w/SS vac wire (SVT or crimped)	V
CB Stainless Braid	S
CPB Polypropylene Braid	P
CWB Stainless Braid, SS Vacuum Wire	E
CPWB Poly Braid, SS Vacuum Wire	R
CHB Hastelloy® Braid, (CTH)	H
CKB Kynar® Braid	K

Rubber Covered Convuluted

CRC Twister™ Yellow EPDM w/conv. PTFE	A
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Rubber Covered Smooth-Bore FEP Teflon®

TRC-FEP Green EPDM w/FEP Teflon®	G
WTRC-FEP Light Gray EPDM w/FEP Teflon®	W

Rubber Covered Smooth Bore PTFE Teflon®

TRC Blue EPDM w/PTFE Tube	B
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Smooth Bore Braided (True Bore ID)

SBT Stainless Braid (True ID)	F
SFT-Si "Superflex" SS Braid, Fiberglass, Silicone Cover	J
SHBT Hastelloy® Braid Smooth Bore	I

TMH Dual Containment

TMH 316 Stainless Hose w/PTFE Liner	M
TMH-Monel Monel® Hose w/PTFE Liner	Y
TMH-Hastelloy Hastelloy® Hose w/PTFE Liner	Q

TR Truck-Rail Hose

TR Heavy NOprenne w/Smooth PTFE	T
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* Indicates Limited Lengths

Note: Some configurations are not feasible. Refer to the price page of each product for availability of components.

Assembly Part Numbers



Example: Hose Length = 12-1/2"
Length Code = 0124

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Special Fitting

Non-Standard Special	99
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Hastelloy®	H
Solid Kynar®	K
Solid Teflon®	T
Solid Polypropylene	P
Spec EP/Passivation	Q
15 Ra EP 316SS	R
Carbon Steel	C
Special Material	X
None	0

Ductile Iron 150#	D
Ductile Iron 150#, Galvanized	I
Ductile Iron 300#	A
Carbon Steel 150# (epoxy coated)	C
Carbon Steel 300# (epoxy coated)	B
Carbon Steel 150# (uncoated)	J
Carbon Steel 300# (uncoated)	L
304 Stainless 150#	4
304 Stainless 300#	E
316 Stainless 150#	6
316 Stainless 150# - (Domestic)	7
316 Stainless 300#	G
316 Stainless 600#	8
316 Stainless DIN PN10	N
Monel® 150#	M
Monel® 300#	R
Hastelloy 150#	2
Hastelloy 300#	H
Kynar 150#	K
Polypropylene 150#	P
CPVC 150#	V
None	0

Accessories

SS Anti-Kink Casing	A
SS Bend Guard 12"	B
SS Bend Guard 18"	C
SS Bend Guard 24"	K
Clear Silicone Cover	D
HDPE Plastic Spiral Guard	E
External Spring Guard	G
Fire Sleeve	J
FEP Teflon® Heat Shrink	M
Rubber Sleeve	F

Polyolefin Heat Shrink:

*Red	PR
*Black	PB
*White	PW
*Yellow	PY
*Green	PG
*Clear	PC

Other colors available on request.

Auxiliary Flange One End	R
Auxiliary Flange Two End	S

TMH Vent Coupling One End	1
TMH Vent Coupling Both Ends	2
TMH (2) Vent Coupling Both Ends	4
TMH Vent Monitor Port (no threads)	5
TMH Vent Monitor Port (female pipe)	6

Metal Tag Attached (see note)	T
Paper Tag	TP

Note: Content for tags to be specified in the description)

Special Accessory	X
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